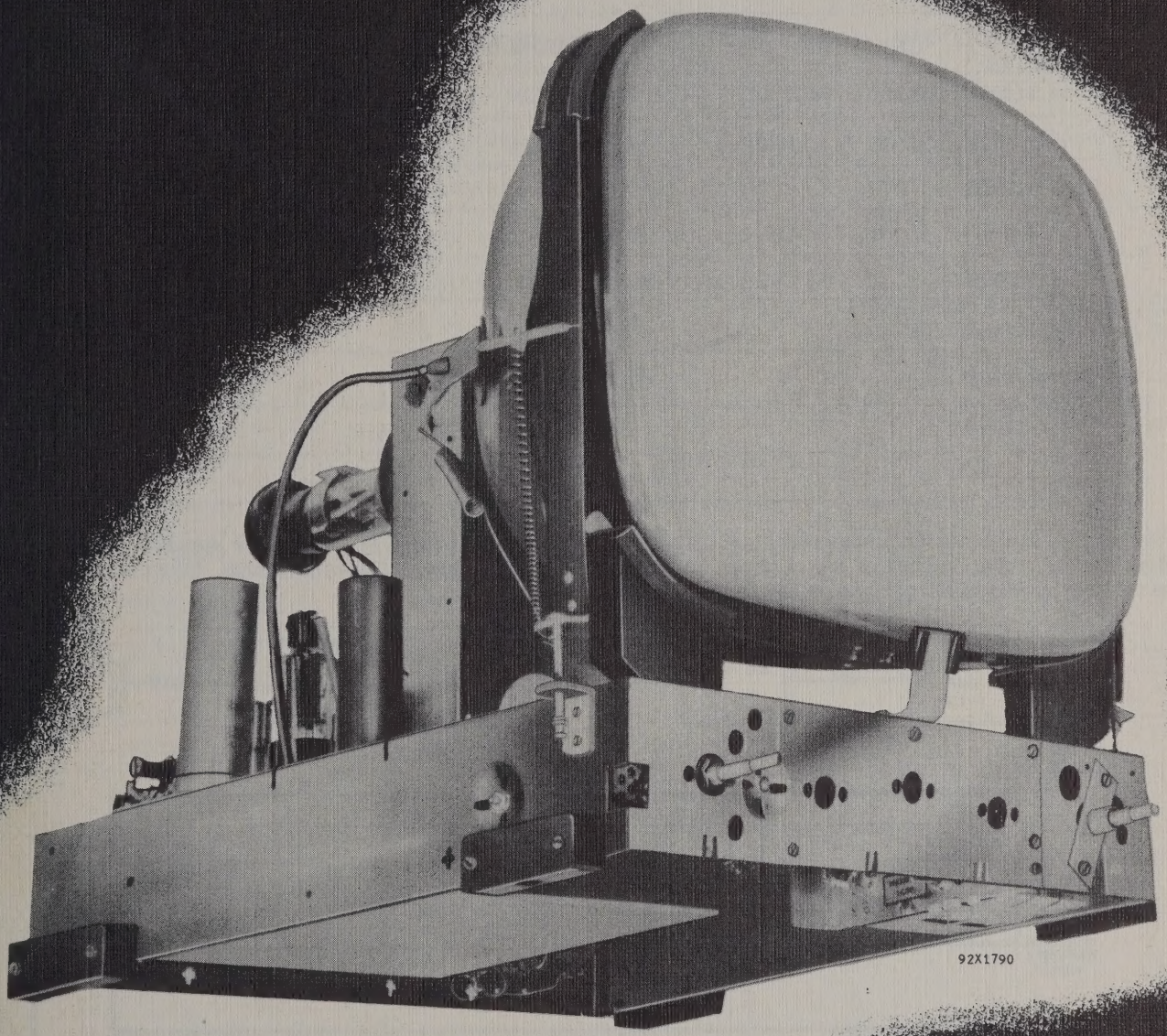
hallicrafters

SERVICE DATA



for SERIES 1200D TELEVISION CHASSIS WITH PREFIX LETTERS A, D, F, G, J, K, L, P, R, T, W & X

94X955-3
1052

CHASSIS IDENTIFICATION

A chassis stamp, located on the right side of the rear apron of the chassis, provides the necessary information to identify the chassis and thereby determine the applicable service data and schematic diagram. The first letter of this chassis stamp indicates the chassis type and the number with letter suffix designates the chassis series. A production run number is stamped directly below or to one side of the chassis identification stamp. At the start of production, chassis are stamped RUN 1. Whenever a major production change is made in the chassis, the run number changes to the next higher number.

*CHASSIS NO.	MODELS CHASSIS MAY BE USED IN
A1200D, K1200D or W1200D	1010P, 1012P
D1200D, L1200D or X1200D	1021P, 1026P
F1200D	1013C
G1200D	1022C, 1027C
J1200D	1062C, 1063C
P1200D	1051P, 1052P
R1200D	1053P, 1054P
T1200D	1055C, 1056C, 1060C, 1061C

* This service literature furnishes technical information on the CHASSIS ONLY. See the separate Service Data page (identified by model number at top of page) for cabinet parts list, general specifications, tube complement, and any specialized service instructions on the complete television receiver.

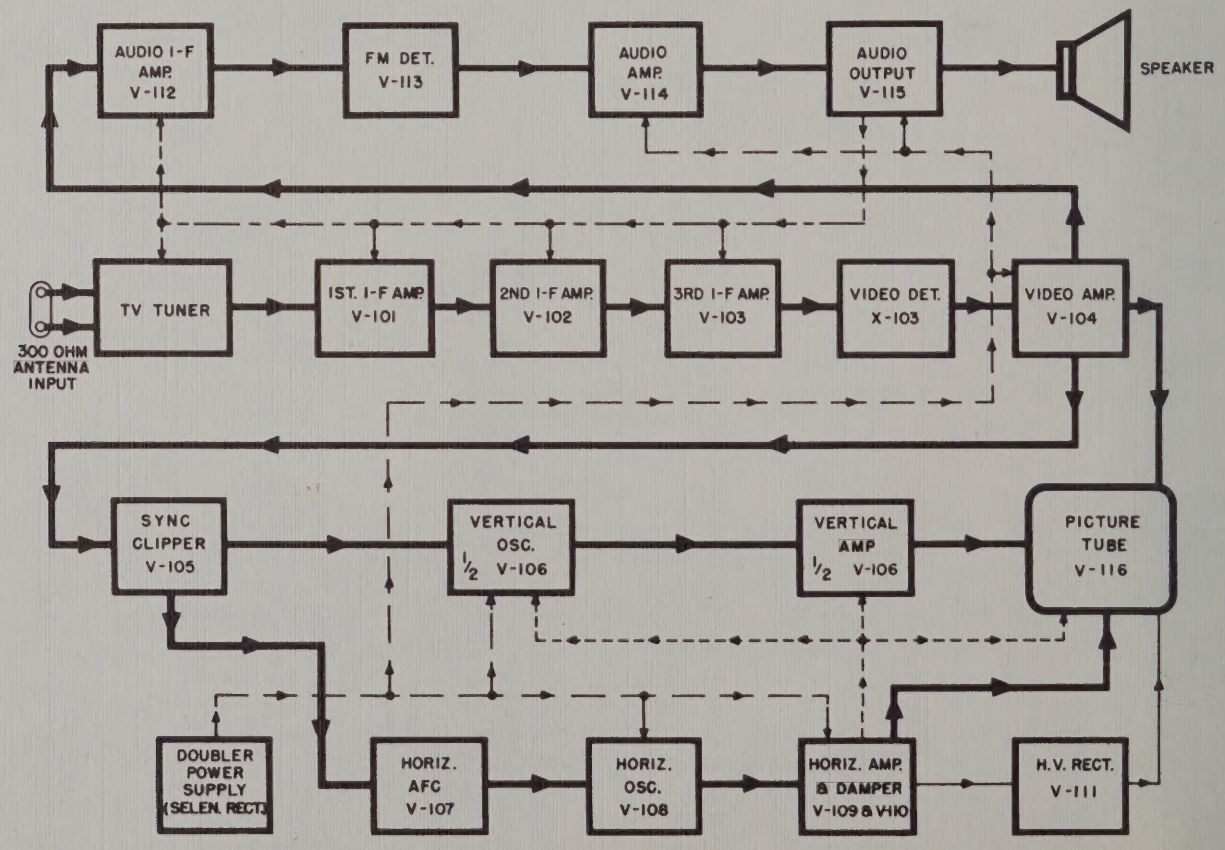


Fig. 72A. Block Diagram of a Typical Chassis

92D1770

COMPARISON OF 1200 SERIES CHASSIS

The A1200D may be considered the basic chassis in the series 1200 chassis. The D, F, G, K, L, W and X1200D chassis are all based on the A1200D chassis with any one or more of the modifications shown on the following pages. See chart below for modifications used in any particular chassis.

COMPARISON CHART FOR 1200 SERIES

CHASSIS	PIX TUBE SIZE See Modification I	HEATER CIRCUIT See Modification IV	TUNER TYPE See Modification VII	MODIFICATIONS USED and/or NOTES FOR RUN 1
A1200D	17" glass	Series-parallel	1C1345 Pentode	Basic 1200 series chassis.
D1200D	20" glass	Series-parallel	1C1345 Pentode	I except step D & II
F1200D	17" glass	Transformer	1C1376 Cascode	II, III, IV, VI & VII
G1200D	20" glass	Transformer	1C1376 Cascode	I, II, IV, VI & VII On some chassis, R-181 is 270,000 ohms and R-194 value is 100,000 or 120,000 ohms.
J1200D	21" metal	Transformer	1E1380 Cascode	I, IV, VI, VIII, IX, X, XI & XII
K1200D	17" glass	Transformer	1C1345 Pentode	IV & V
L1200D	20" glass	Transformer	1C1345 Pentode	I except step D, II, IV & V
P1200D	17" glass	Series-parallel	1C1345 Pentode	VI, IX & X
R1200D	21" metal or glass	Series-parallel	1C1345 Pentode	I, VI, VIII, IX & X
T1200D	21" metal	Transformer	1C1376 Cascode	I, IV, VI, VII, VIII, IX, X & XII
W1200D	17" glass	Series-parallel	1C1345 Pentode	II & VI
X1200D	20" glass	Series-parallel	1C1345 Pentode	I, II & VI

COMPARISON OF 1200 SERIES CHASSIS (Cont.)

LIST OF MODIFICATIONS

MODIFICATION I

To change from a 17 inch to a 20 or 21 inch picture tube the following changes are made:

LOCATION OF CHANGE	CHANGE MADE
A. High side of Horizontal Hold control	82,000 ohms, ½ watt resistor (R-178) added.
B. Plate (pin 2) circuit of Horizontal Oscillator	220,000 ohms, ½ watt resistor (R-179) added.
C. Plate supply decoupling of Horizontal Oscillator (pin 2)	.1 mfd., 600 v. paper capacitor (C-162) added.
D. Plate supply decoupling of Horizontal Oscillator (pin 2)	120,000 ohms, ½ watt resistor (R-156) replaced by 180,000 ohms, ½ watt resistor (R-194).
E. Plate (pin 2) circuit of Horizontal Oscillator	4700 ohms, ½ watt resistor (R-157) replaced by 8200 ohms, ½ watt resistor (R-180).
F. Plate (pin 2) circuit of Horizontal Oscillator	470 mmf. silver mica capacitor (C-145) replaced by 390 mmf. silver mica capacitor (C-163).
G. Horizontal Output stage grid coupling	5000 mmf. disc ceramic capacitor (C-146) replaced by 560 mmf. silver mica capacitor (C-164).
H. Horizontal Output stage grid leak	330,000 ohms, ½ watt resistor (R-158) replaced by 390,000 ohms, ½ watt resistor (R-181).
I. Horizontal Output stage screw bypass	.047 mfd., 400 v. paper capacitor (C-165) added
J. Horizontal Output stage screen resistor	10,000 ohms, 2 watts resistor (R-182) added.
K. Horizontal Output stage output transformer	Horizontal output transformer T-106 (55D193) replaced by T-109 (55D197).
L. Servo Loop feedback from Horizontal Output to AGC tube	Two 150,000 ohms, 1 watt resistors (R-151 & R-152) series connected replaced by 33,000 ohms, 1 watt resistor (R-177).
M. Series capacitor in doubler power supply	140 mfd., 150 v. electrolytic capacitor (C-135) replaced by 200 mfd., 150 v. electrolytic capacitor (C-161).
N. Audio voltage amplifier cathode resistor	1500 ohms, ½ watt resistor (R-169) replaced by 1200 ohms, ½ watt resistor (R-176)
O. Speaker	Speaker with field coil resistance of 85 ohms replaced by speaker with field coil resistance of 61 ohms

MODIFICATION II

The 75 mmf., 500 V. ceramic capacitor (C-142) connected from plate pin 5 to ground of the Horizontal Oscillator, V-108, is replaced by a 100 mmf., 500 v. silver mica capacitor (C-170). Some chassis have neither C-142 or C-170. The 100 mmf. capacitor, C-170, is the preferred capacitor.

MODIFICATION III

The horizontal integrating network in the grid circuit (pin 4) of the Horizontal Oscillator is changed as follows:
A. 4.7 megohms, ½ watt resistor (R-149) is replaced by 470,000 ohms, ½ watt resistor (R-189).
B. .003 mfd., 400 v. paper capacitor (C-139) is replaced by .005 mfd., 400 v. paper capacitor (C-167).
C. .01 mfd., 400 v. paper capacitor (C-141) is replaced by .05 mfd., 400 v. paper capacitor (C-168).

COMPARISON OF 1200 SERIES CHASSIS (Cont.)

MODIFICATION IV

To replace series parallel heater arrangement with a heater transformer the following changes are made:

LOCATION OF CHANGE	CHANGE MADE
A. Between power line and Damper heater pin 8	190 ohms cold/19 ohms hot, 5 watts negative temperature coefficient resistor (R-143) deleted.
B. Heater string shunt	80 ohms, 10 watts, 5% resistor (R-144) deleted.
C. Heater string shunt	42 ohms, 3 watts, 5% resistor (R-145) deleted.
D. Heater string choke	Air core r-f choke (L-113) deleted.
E. First I.F. Amplifier heater bypass	4000 mmf. dual disc ceramic capacitor (C-104) deleted.
F. Ratio Detector heater bypass	5000 mmf. disc ceramic capacitor (C-106) deleted.
G. Video Amplifier heater bypass	5000 mmf. disc ceramic capacitor (C-158) deleted.
H. 4.5 MC Amplifier heater bypass	5000 mmf. disc ceramic capacitor (C-159) deleted.
I. Heater transformer	Auto transformer T-110 (52C258) added.
J. Sync. Clipper V-105	12SN7GT tube replaced by 6SN7GT tube.
K. Horizontal Output V-109	25BQ6GT tube replaced by 6BQ6GT tube.
L. Audio Output V-115	25L6GT tube replaced by 6W6 tube.
M. Audio Output tube socket wiring	Cathode pin 8 connected directly to heater pin 7 to place both heater and cathode at the same potential.

MODIFICATION V

LOCATION OF CHANGE	CHANGE MADE
A. Integrating network in Vert. Osc. grid circuit	22,000 ohms, $\frac{1}{2}$ watt resistor (R-133) replaced by 47,000 ohms, $\frac{1}{2}$ watt resistor (R-183).
B. AGC divider network in Sync. Clip. plate circuit	3300 ohms, $\frac{1}{2}$ watt resistor (R-132) replaced by 2200 ohms, $\frac{1}{2}$ watt resistor (R-184).
C. Horizontal Oscillator cathode resistor	1200 ohms, $\frac{1}{2}$ watt resistor (R-153) replaced by 1500 ohms, $\frac{1}{2}$ watt resistor (R-185).
D. Horizontal Oscillator plate circuit (pin 2)	4700 ohms, $\frac{1}{2}$ watt resistor (R-157) replaced by 8200 ohms, $\frac{1}{2}$ watt resistor (R-180).
E. Horizontal Oscillator plate circuit (pin 2)	470 mmf. silver mica capacitor (C-145) replaced by 390 mmf. silver mica capacitor (C-163).
F. Horizontal Oscillator Adjustment	Test point (A) removed and the Horizontal Oscillator Adjustment procedure changed. See page 1952-78.

MODIFICATION VI

This modification is composed of MODIFICATION V plus the following changes:

LOCATION OF CHANGE	CHANGE MADE
A. Sync. Clipper plate circuit (pin 2)	680,000 ohms, $\frac{1}{2}$ watt resistor (R-127) replaced by 1.2 megohms, $\frac{1}{2}$ watt resistor (R-190).
B. Sync. Clipper grid leak (pin 4)	22,000 ohms, $\frac{1}{2}$ watt resistor (R-130) replaced by 47,000 ohms, $\frac{1}{2}$ watt resistor (R-191).
C. High side of Horizontal Hold control	82,000 ohms, $\frac{1}{2}$ watt resistor (R-178) added.
D. Sync. Clipper plate (pin 5) circuit supply	10,000 ohms, 1 watt resistor (R-192) added.
E. Sync. clipper plate (pin 5) circuit supply	22,000 ohms, 1 watt resistor (R-193) added.
F. Sync. Clipper plate (pin 5) circuit supply	10 mfd., 150 v. electrolytic capacitor (C-169) added.
G. AGC Control Switch	Switch S-102 (60B500) replaced by S-103 (60B507).
H. AGC Control Switching	22,000 ohms, 1 watt resistor (R-188) added.

COMPARISON OF 1200 SERIES CHASSIS (Cont.)

MODIFICATION VII

To use a 1C1376 Cascode tuner in place of the 1C1345 Pentode tuner the following changes are made:

A. The 1C1345 Pentode tuner is removed and replaced by the 1C1376 Cascode tuner. These two tuners do not have the same terminal connections. Refer to schematic diagram. The 1C1376 Cascode tuner may be used only with chassis which have a heater transformer.
B. A wire to supply 260 volts d-c is added between tuner terminal 4 of the Cascode tuner and the junction of R-120 (33,000 ohms, 1 watt, the video amplifier screen resistor) and the 260 volt "B" supply.

MODIFICATION VIII

Whenever the picture tube used has a metal cone which eliminates the high voltage filter capacitor built into tubes with an outer aquadag coating, C-166 (500 mmf. 20,000 volts) is required between pin 7 and ground of the 1B3GT high voltage rectifier.

MODIFICATION IX

A. A deeper chassis with a depth of 3 3/4" instead of 3" is used.
B. The tuner, three i-f amplifiers, video detector, video amplifier, 4.5 MC amplifier and the ratio detector are mounted on a separate sub-chassis.
C. Test socket SO-101 is deleted.
D. The 6C4 audio amplifier tube, V-144, is moved to a new location slightly forward and to one side of the vertical output transformer.

MODIFICATION X

The horizontal stabilizer coil L-108 (55B1536) is replaced by coil 51B1642 and its mounting plate 63A902. When coil 51B1642 is used for L-108, plate 63A902 must also be used and either C-142 (75 mmf.) or C-170 (100 mmf.) connected between pin 5 of the horizontal oscillator and ground is deleted. Coil 51B1642 is preferred. However, the 55B1536 coil will be found in some chassis. Use coil 51B1642 and plate 63A902 for replacement purposes.

MODIFICATION IX

To use a 1E1380 Cascode tuner in place of the 1C1345 Pentode tuner the following changes are made:

A. The 1C1345 Pentode tuner is removed and replaced by the 1C1380 Cascode tuner. The 1E1380 tuner does not have terminal lugs on the back. The wire leads from this tuner must be connected to the correct points in the chassis as shown in the schematic diagram. The 1E1380 tuner also requires a supply voltage of approximately 250 volts as shown in the schematic diagram. The 1E1380 tuner may be used only with 3 3/4" deep chassis which have a heater transformer.
B. Resistor R-101 (100,000 ohms, $\frac{1}{2}$ watt) in the A.G.C. bus is not required.

MODIFICATION XII

The vertical and horizontal hold controls are moved from the rear apron of the chassis to a removable plate mounted on the front apron of the chassis.

SERVICE ADJUSTMENTS

Note: The controls whose adjustment is outlined below are all located on the rear apron of the chassis with the exception of the centering device which is located on the neck of the picture tube. The sequence of "SERVICE ADJUSTMENTS" outlined herein is suggested as a convenient method of approach and is not an arbitrary procedure. Variations of the procedure are permitted to obtain the desired final results. The operating controls, located on the front panel, should be set for as good a pattern as possible before making any of the following adjustments.

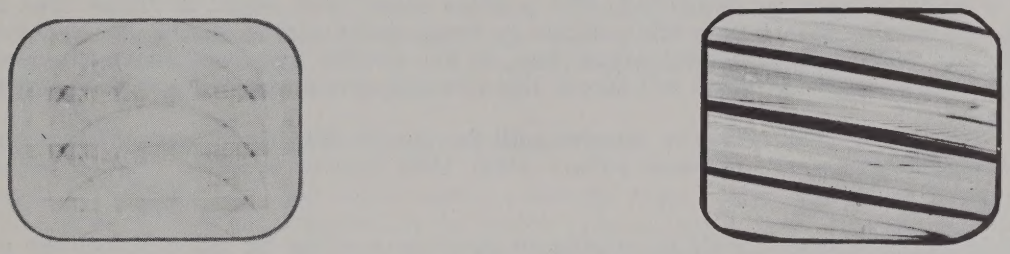


Fig. 73A. Improper Hold Control Adjustments

VERTICAL AND HORIZONTAL HOLD CONTROLS - These two controls should be adjusted until a single steady picture is obtained. With average signal strength it should be possible to switch from one active channel to another without losing sync when these two controls are properly adjusted.

Fig. 73B. Improper Centering Adjustments

CENTERING - Place the horizontal centering control, located on the rear apron of the chassis, in the approximate center of the range over which it may be rotated. Rotate the two ring magnets of the centering device around the neck of the picture tube until the picture is properly centered. Each ring magnet is provided with an ear for making this adjustment. The centering device should contact the rear of the deflection yoke. A slight readjustment of the ion trap may be necessary after adjusting the centering device. The horizontal centering control may now be adjusted as required for a fine adjustment of the horizontal picture centering.

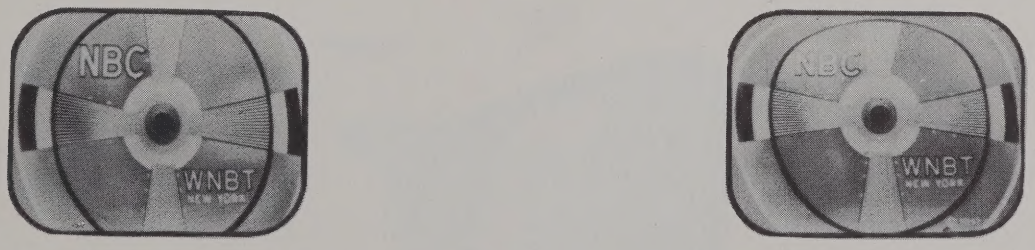


Fig. 73C. Improper Height Control Setting

Fig. 73D. Improper Vertical Linearity Control Setting

HEIGHT CONTROL AND VERTICAL LINEARITY ADJUSTMENT - A test pattern will be required for the proper adjustment of these two controls. The height control has a pronounced effect on the overall picture height and at the same time the adjustment of this control will expand or contract the top of the picture more than the bottom. The vertical linearity control will affect the height somewhat but will have a more pronounced effect on the bottom portion of the picture. The interaction between these two controls makes it necessary to adjust both for proper picture height and vertical linearity.

SERVICE ADJUSTMENTS (Cont.)

A.G.C. CONTROL SWITCH - The A.G.C. control switch should be adjusted for the best average performance on all active channels.

With this switch set in the 0-10 MILE position (counterclockwise) maximum AGC voltage is applied to the tuner. The video amplifier will not be overloaded by strong signals.

With this switch set in the OVER 30 MILES position (clockwise) minimum AGC voltage is applied to the tuner. Snow in the picture will be at minimum when the switch is in this position under weak signal or fringe area receiving conditions. If the AGC control switch is left in this position in areas where strong signals are received, poor picture quality will result along with a probable intercarrier buzz in the speaker. In some cases the sync pulses will be clipped and trouble will be encountered which will appear like a loss of sync unless this switch is properly adjusted.

WIDTH CONTROL - The width control should be adjusted until the picture fills the screen horizontally. Rotating this control in the clockwise direction will increase picture width while counterclockwise rotation will decrease picture width.

BRIGHTNESS CONTROL - This control should be adjusted in any given location for the best average picture from the various active channels which may be received.

FOCUS CONTROL - Adjust this control until the fine horizontal lines which make up the picture are clearly visible. Use the lines in the center portion of the picture for this adjustment.

HUM ADJUSTMENT - A small rheostat will be found mounted on the frame of some of the speakers. Adjust this rheostat with a small screw driver for minimum audible hum in the speaker.

PICTURE TUBE REMOVAL

1. Remove the chassis from the cabinet. Note that on chassis with the horizontal and vertical hold controls on the rear apron the knobs on the control shafts and the A.G.C. control switch must be removed before the cabinet back may be removed. These are push-on type knobs.

2. Insure the discharge of the high voltage power supply by disconnecting the anode plug and shorting it to the chassis. Also short the anode socket or metal cone of the picture tube to the chassis.

3. Remove the picture tube socket from the base of the tube.

4. Slip the ion trap and the centering device from the neck of the tube.

5. Carefully remove the rear support tension spring on each side of the picture tube. If a glass cone picture tube is involved, remove the metalized paper picture tube shield and ground by unhooking the springs on each side and the hook on the top center of the picture tube mounting strap.

6. Remove the mounting strap from the front rim of the picture tube.

7. Lift the front of the picture tube just far enough to clear the front mounting brackets and slip the tube forward until the neck is clear of the deflection yoke and the rubber collar. Use a slight twisting pull to break the cone of the tube from the rubber collar if the two are stuck together. Loosen the deflection yoke adjustment screw if required for clearance when raising the front of the picture tube over the front mounting brackets.

CAUTION - IF THE TUBE FAILS TO SLIP OUT EASILY, INVESTIGATE AND REMOVE THE CAUSE OF TROUBLE. DO NOT USE FORCE AS THE NECK OF THE PICTURE TUBE IS EASILY BROKEN.

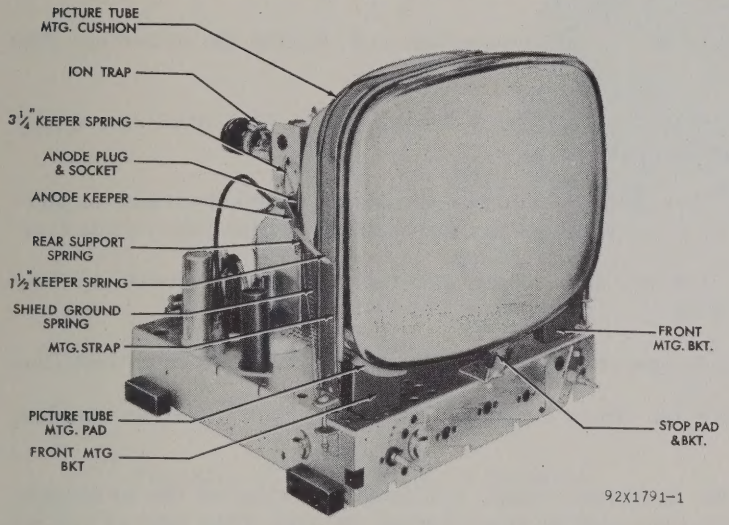


Fig. 75A. 17" Glass Pix Tube Mounting

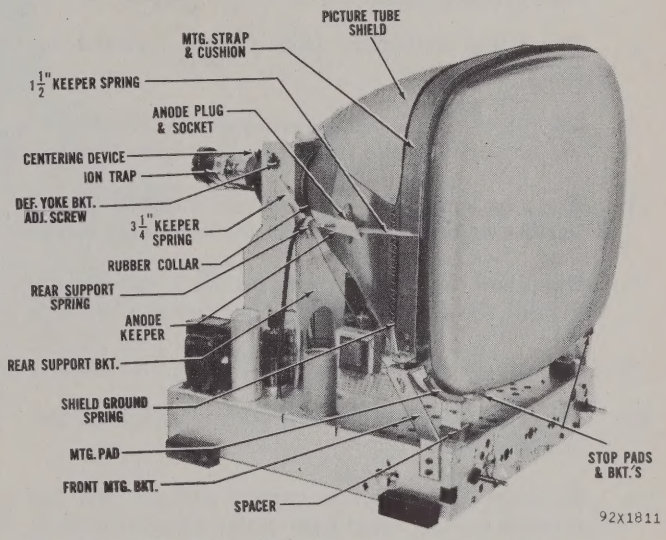


Fig. 75B. 20 or 21" Glass Pix Tube Mounting

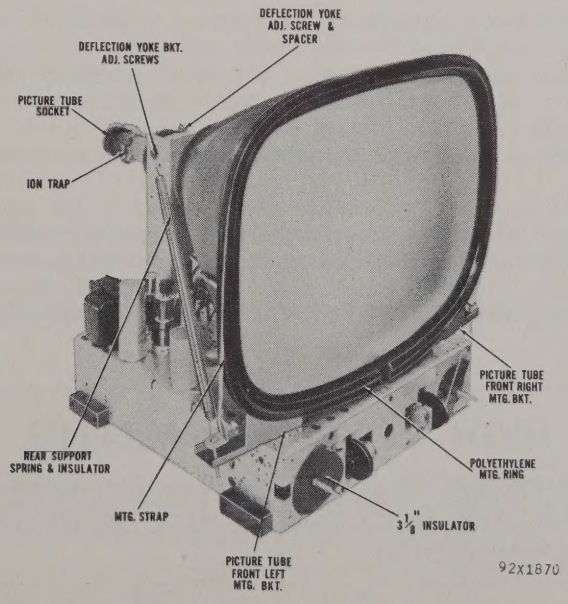


Fig. 75C. 21" Metal Pix Tube Mounting

PICTURE TUBE INSTALLATION AND ADJUSTMENT

1. Position the tube so that the anode socket is located at the left side of the tube when viewed from the front face. A metal cone tube will not have an anode socket but will require the polyethylene mounting ring around the front rim of the tube with the joint in the ring on the bottom center of the tube.

2. Insert the neck of the tube through the rubber collar and the deflection yoke. Seat the front of the tube on the front mounting brackets. The groove in the polyethylene mounting ring fitting over the front mounting brackets or the picture tube face resting against the front stop pad will determine the forward position of the tube. Be sure that the face of the picture tube rests against the stop pad and not against the bracket for this pad which is provided on chassis which use glass cone picture tubes.

3. Place the mounting strap around the front of the tube. On metal cone tubes place the 4" rubber strip in the top center of the groove in the polyethylene mounting ring. At the same time be sure that the copper anode connector strap is inserted under the polyethylene mounting ring on the left side of the picture tube when viewed from the front. Be sure the picture tube mounting cushion is placed under the mounting strap for glass cone tubes.

4. Tighten the screws on each end of the mounting strap and replace the rear support tension spring on each side of the picture tube. On glass cone picture tubes replace the metalized paper picture tube shield and ground with the metalized surface next to the tube. The hook in the center of this shield should be hooked over the top center of the picture tube mounting strap and the springs on each end should be hooked around the screws on each end of the mounting strap. If the replacement glass pix tube does not have an outer aquadag coating it will be necessary to install C-166 (500 mmf. 20 KV.). See schematic. This capacitor will already be installed in chassis with metal cone picture tubes.

5. Press the deflection yoke firmly forward against the cone of the picture tube and tighten the deflection yoke adjusting screw.

6. The picture tube neck should pass through the approximate center of the deflection yoke. If it does not, loosen the deflection yoke bracket adjustment screws and reposition the yoke.

7. Slide the centering device over the neck of the tube. This device should be installed directly behind and contacting the deflection yoke with the adjusting ears for the two ring magnets as near to the deflection yoke as possible.

8. Check the ion trap for any marking and slip the trap over the neck of the tube. If the trap is marked with an arrow, the arrow should point towards the face of the tube.

9. Connect the picture tube anode plug and replace the anode keeper and springs if a glass pix tube is being installed.

10. Connect the picture tube socket and turn the receiver on. Don't forget the chassis is "hot" - use an isolation transformer.

11. Turn up the brightness control and set the ion trap for maximum raster brilliance, backing off the brightness control as the maximum point is approached. The ion trap must be rotated about the axis of the tube as well as shifted along the neck to obtain the proper setting.

12. Tune in a test pattern and set the focus, brightness and contrast controls for as good a picture as possible.

13. Check the position and appearance of the test pattern. If it is off center or shadowed at the corners, adjust the ears of the centering device by rotating them about the axis of the picture tube until proper centering is obtained. An additional horizontal centering control is located on the rear apron of the chassis. This control should be in the approximate center of the range over which it may be rotated before adjusting the centering device.

14. If the lines of the raster are not horizontal or square with respect to the escutcheon, loosen the deflection yoke adjustment screw and rotate the deflection yoke until the proper raster position is obtained. Press the deflection yoke firmly against the cone of the picture tube and tighten the adjustment screw.

15. Follow the procedure under "SERVICE ADJUSTMENTS" and make any minor adjustments necessary to obtain a properly adjusted pattern.

HIGH VOLTAGE WARNING

OPERATION OF THE RECEIVER CHASSIS OUTSIDE OF THE CABINET INVOLVES DANGER OF ELECTRICAL SHOCK. USE A POWER LINE ISOLATION TRANSFORMER AND EXERCISE ALL NORMAL HIGH VOLTAGE PRECAUTIONS WHEN WORKING WITH THIS RECEIVER.

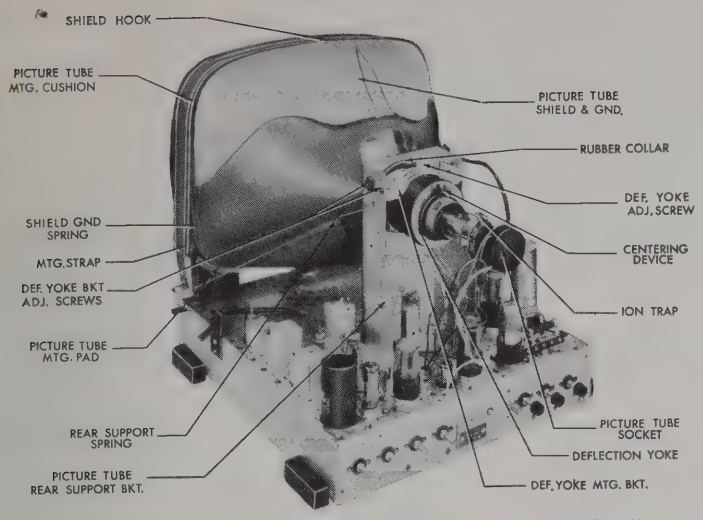


Fig. 77A. 17" Glass Pix Tube Mounting

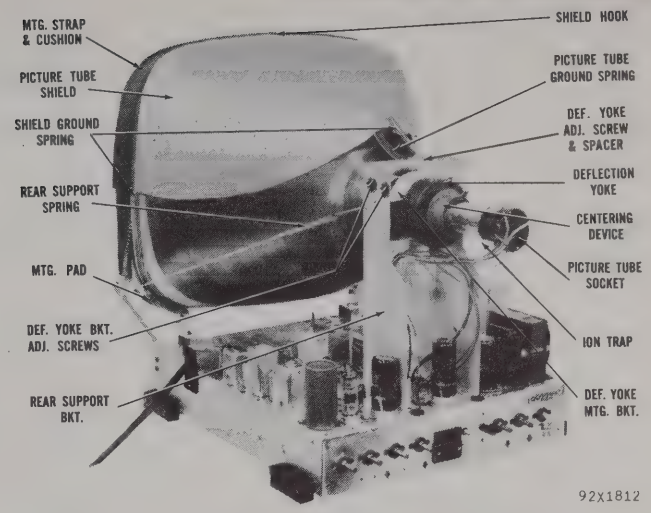


Fig. 77B. 20 or 21" Glass Pix Tube Mounting

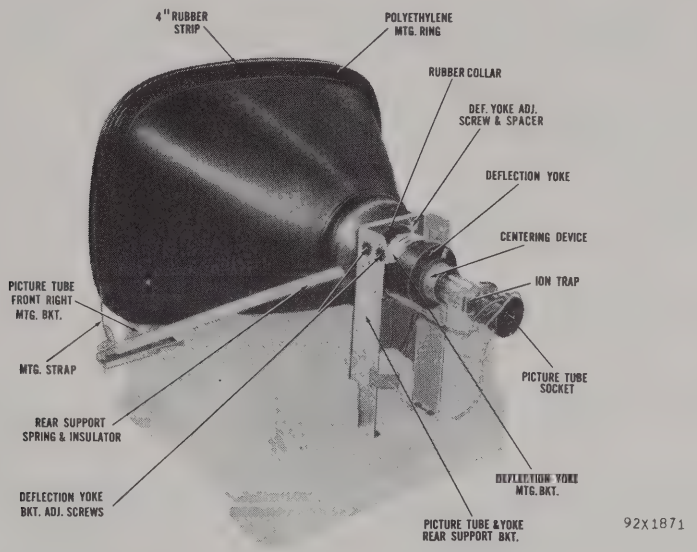


Fig. 77C. 21" Metal Pix Tube Mounting.

PICTURE TUBE ANODE HIGH VOLTAGE MEASUREMENT

The second anode potential for a 17 inch tube will be approximately 11,500 volts and approximately 14,000 volts for a 20 or 21 inch tube. If it is possible to obtain good picture brilliance, the second anode potential is correct and need not be measured.

The setting of the width control will affect the high voltage on the second anode. If the width control is set for excessive width, the second anode potential will be low.

If it is necessary to measure the voltage present on the second anode, a meter specifically designed for high voltage measurements should be used. The contrast and brightness controls should be rotated to the minimum position and the anode plug should be connected to the tube. Under these conditions the test meter will load the high voltage power supply approximately the same amount as the picture tube would during normal operation.

SAFETY FIRST

DO NOT USE HAND HELD FLEXIBLE TEST LEADS WHEN MAKING SECOND ANODE HIGH VOLTAGE MEASUREMENTS. ANY ACCIDENTAL CONTACT WITH THE HIGH VOLTAGE PRESENT IN THIS CIRCUIT MAY CAUSE A SEVERE BURN OR IN SOME CASES BE FATAL.

HORIZONTAL OSCILLATOR ADJUSTMENT FOR CHASSIS A1200D & X1200D

If the horizontal hold control fails to restore synchronization, the horizontal stabilizer coil (L-108) should be adjusted. Procedure for this adjustment is as follows:

1. Set the brightness control for normal picture brightness and turn the contrast control as low as possible with a picture still visible on the screen.

2. Turn the horizontal centering control, located on the rear apron of the chassis, full clockwise. The right side of the raster should now be visible. If not, reduce the width of the picture by turning the width control counterclockwise until the right edge of the raster does become visible.

3. Connect a .1 mfd. 600 V. tubular capacitor between test point (A) and the chassis. See Fig. 78B.

4. Adjust the horizontal hold control for a single steady picture whose right edge is approximately $\frac{1}{4}$ inch to the left of the right edge of the raster. See Fig. 78A.

5. Remove the .1 mfd. 600 V. capacitor installed in step 3.

6. Adjust the horizontal stabilizer coil, (L-108) until the right edges of the picture and the raster are the same distance apart as they were set in step 4. See Fig. 78A.

7. Readjust the horizontal centering control and the width control for normal operation.

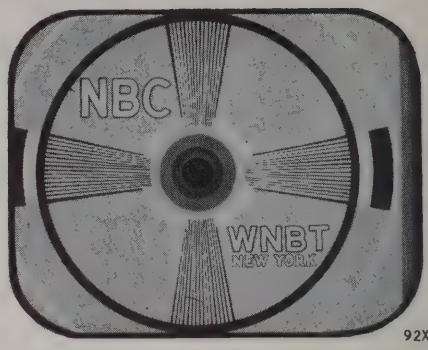


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Fig. 78A. Test Pattern for Horizontal Stabilizer Adjustment

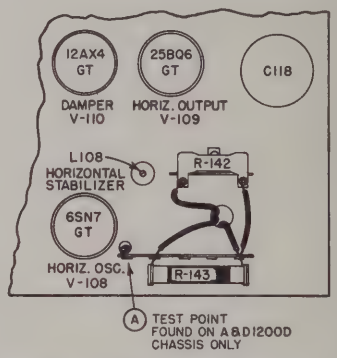

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Fig. 78B. Horizontal Oscillator Adjustment Point for Chassis with Series—Parallel Heaters

HORIZONTAL OSCILLATOR ADJUSTMENT FOR CHASSIS F, G, J, K, L, P, R, T, W, & X1200D

If the horizontal hold control fails to restore synchronization, the horizontal stabilizer coil (L-108) should be adjusted. Procedure for this adjustment is as follows:

1. Set the horizontal hold control in the approximate center of the range over which it may be rotated.

2. Set the channel selector to an active channel and adjust the horizontal stabilizer for a single steady picture. See Fig. 78B or 78C.

3. Rotate the horizontal hold control full clockwise. The picture may or may not remain in sync. If it does, momentarily switch the channel selector to another channel and return it to the original channel. The picture should now be slightly out of sync.

4. Rotate the horizontal hold control full counterclockwise. The picture may or may not remain in sync. If it does, momentaril switch the channel selector to another channel and return it to the original channel. The picture should now be slightly out of sync.

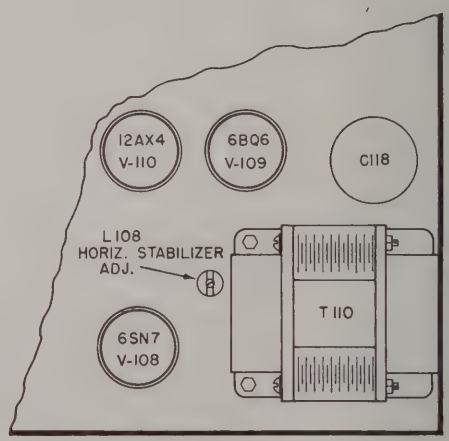

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Fig. 78C. Horizontal Oscillator Adjustment Point for Chassis with Heater Transformer

When the horizontal stabilizer coil is properly adjusted the results outlined in steps 3 and 4 will be obtained. If the correct results are not obtained, repeat steps 2, 3 and 4 until they are.

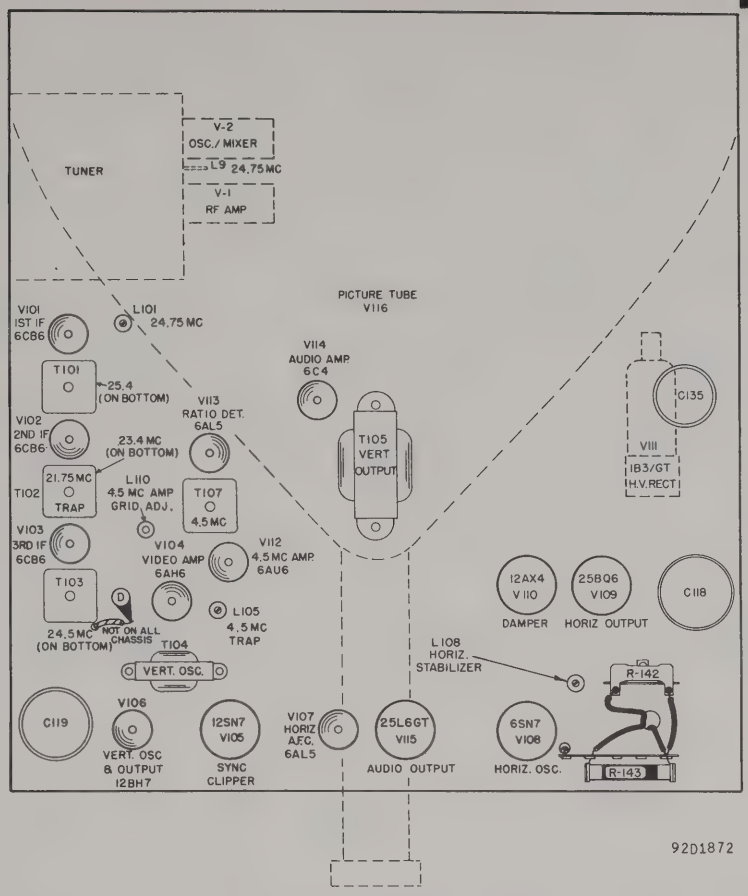

Fig. 79AA. Top View Chassis Alignment Locations for Chassis P & R1200D

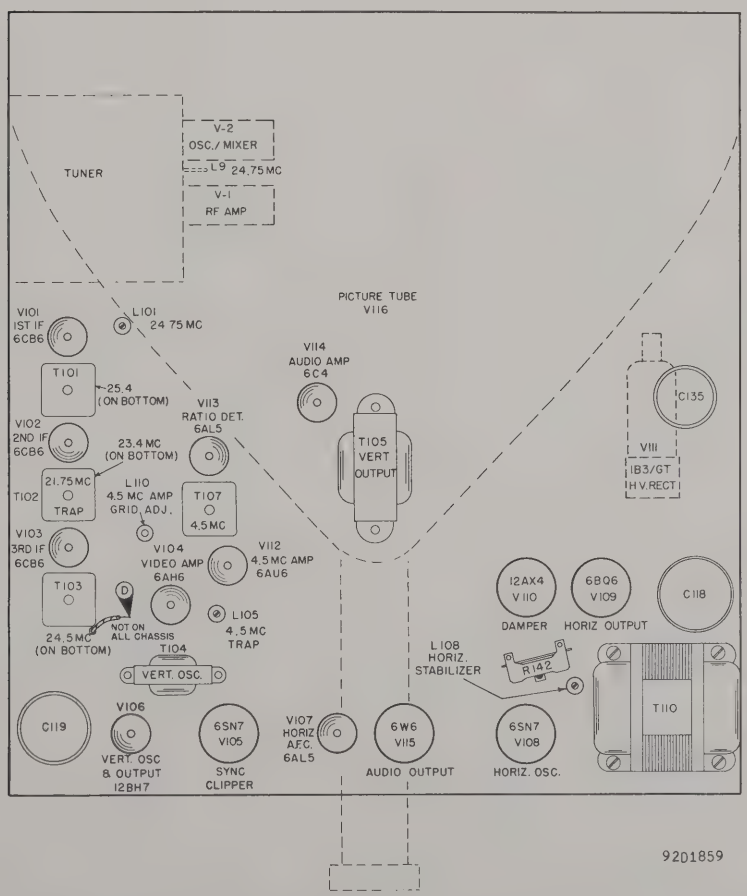

Fig. 79AB. Top View Alignment Locations for Chassis J & T1200D

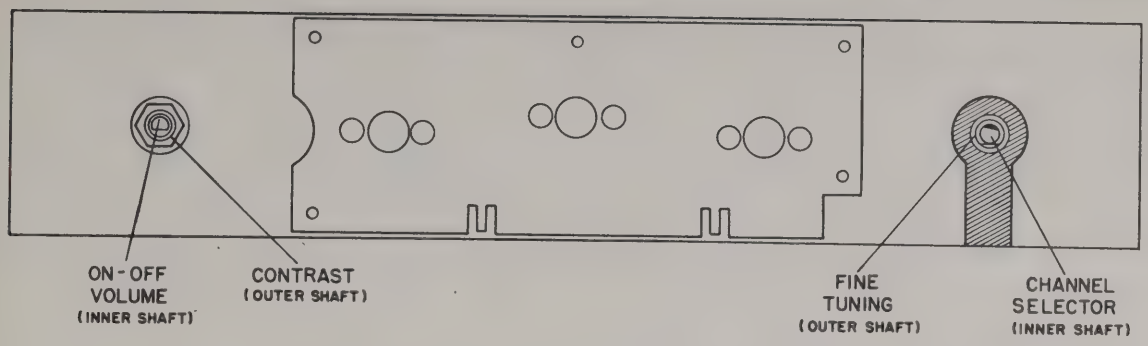

Fig. 79A. Front Controls for Chassis A, D, F, G, K, L, P, R, W, and X1200D

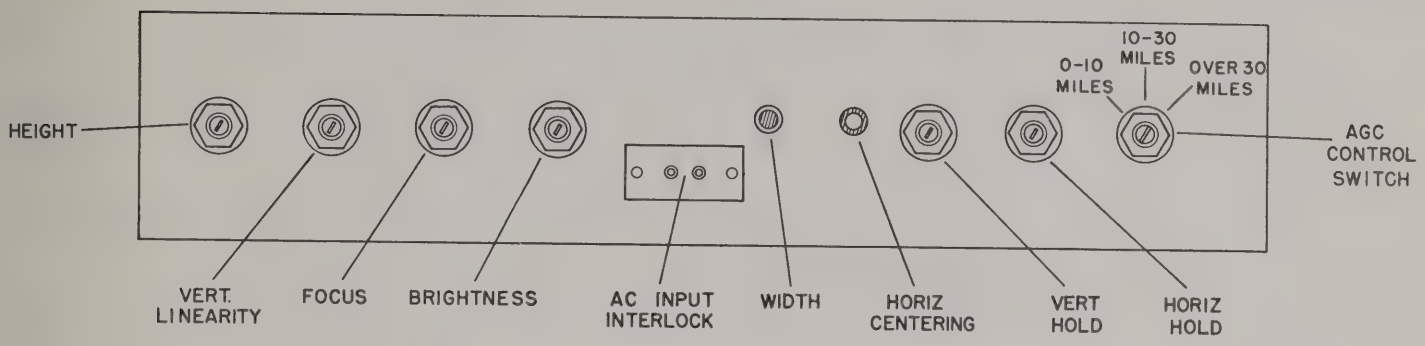

Fig. 79B. Rear Controls for Chassis A, D, F, G, K, L, P, R, W and X1200D

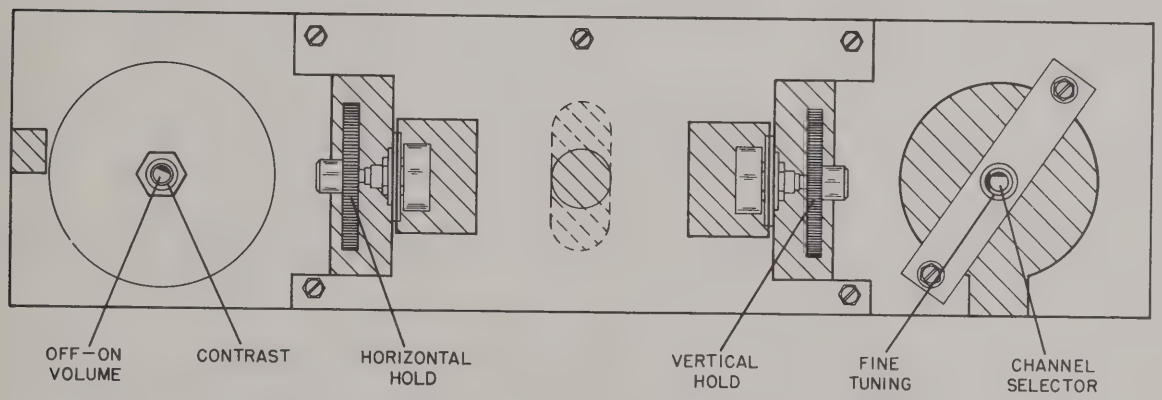

Fig. 79C. Front Controls for Chassis J1200D and T1200D

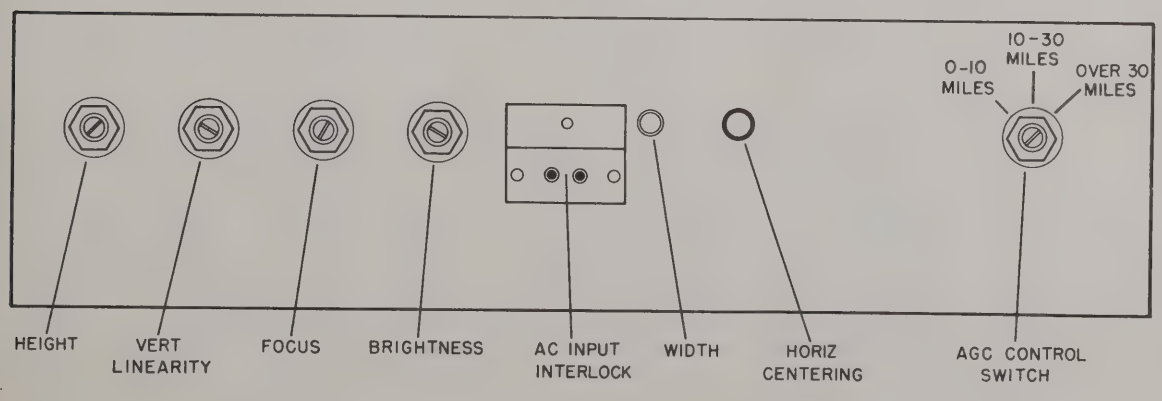

Fig. 79D. Rear Controls for Chassis J1200D and T1200D

FM SOUND CHANNEL ALIGNMENT FOR 1200 SERIES CHASSIS

EQUIPMENT REQUIRED

Signal generator covering 4 to 30 mc. unmodulated.

Vacuum tube voltmeter (VTVM).

Sound alignment test circuit shown in Fig. 80A.

Power line isolation transformer.

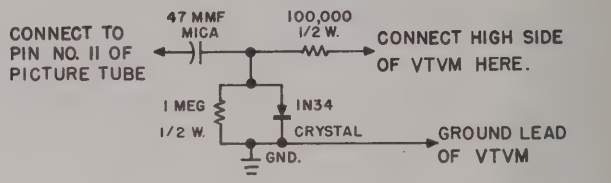

Fig. 80A. Sound Alignment Test Circuit

PROCEDURE

1. Connect all test equipment to a common ground. Connect the TV chassis to this same ground after installing an isolation transformer between the power line and the TV chassis. One side of the line cord connects directly to the TV chassis and an isolation transformer must be used for safety.

2. Set the channel selector to any vacant channel and the contrast control at minimum.

3. Connect the signal generator output through a .005 mfd. capacitor to terminal 2 of test socket SO-101 shown in Figs. 81A and 81B or test point Ⓓ shown in schematic diagram. Ground the shield of the generator output cable to terminal 1 of the test socket or the chassis.

4. Connect the sound alignment detector circuit and VTVM as shown in Fig. 80A. Adjust the 4.5 mc. generator output (unmodulated) to give a 1 volt reading on the VTVM.

5. Adjust the 4.5 mc. trap adjustment (L-105) at 4.5 mc. for a minimum VTVM reading.

6. Disconnect the test circuit and connect the VTVM to test terminal Ⓑ (Pin 2 of FM detector, V-113). See schematic diagram.

7. Adjust the 4.5 mc. amplifier grid adjustment (L-110) and the primary of T-107 (bottom core) at 4.5 mc. for a maximum VTVM reading.

8. Connect the VTVM to test terminal Ⓒ, shown in the schematic diagram. Adjust the secondary of T-107 (top core) at 4.5 mc. for the zero reading which occurs between the positive and negative peaks. If the zero reading occurs at more than one setting, use the position nearest the top limit of the core.

9. Shift the signal generator an equal amount on either side of 4.5 mc. and touch up the primary of T-107 (bottom core) for approximately equal peaks. Use just enough signal output to obtain one volt peaks for best results.

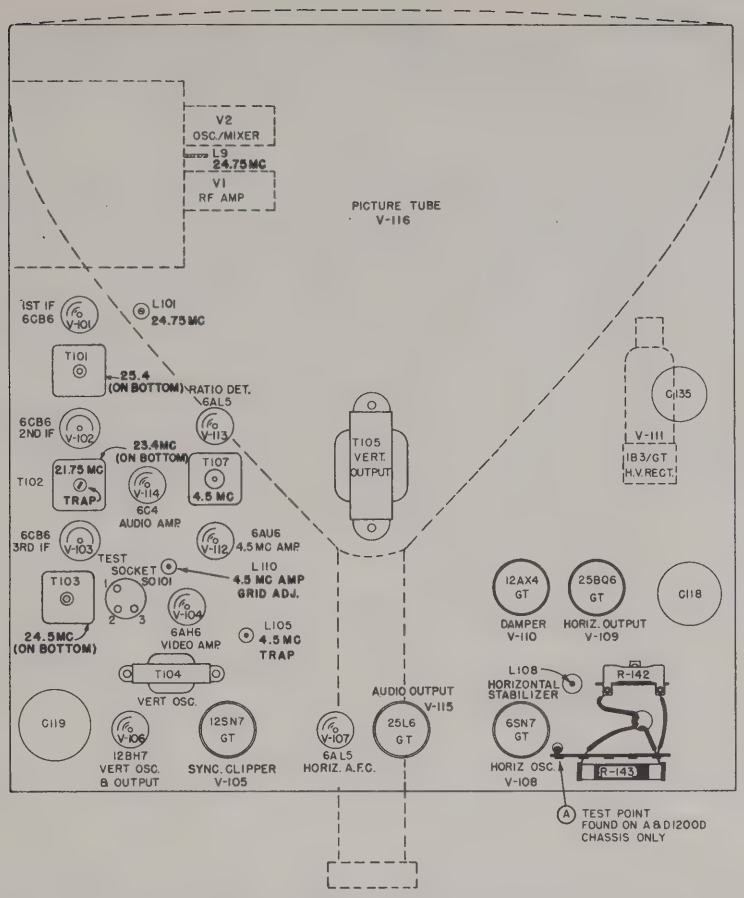

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Fig. 81A. Top View Chassis Alignment Location for Chassis A, D, W & X1200D

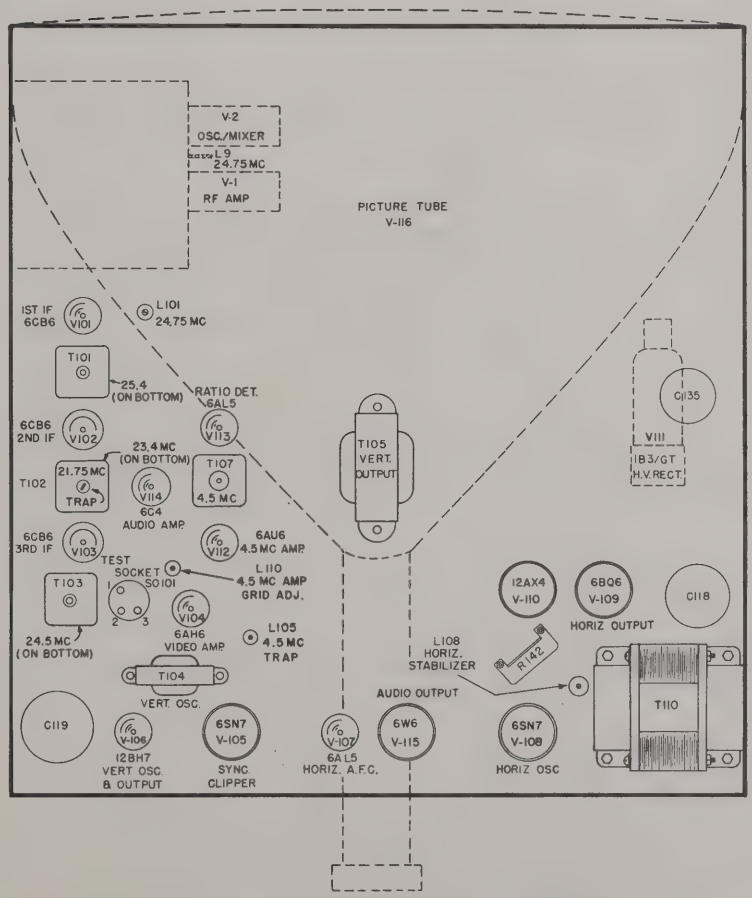

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Fig. 81B. Top View Alignment Locations for Chassis F, G, K & L1200D

I-F AMPLIFIER ALIGNMENT FOR 1200 SERIES CHASSIS

EQUIPMENT REQUIRED

SWEEP GENERATOR	RCA type WR-59B or equivalent.
MARKER GENERATOR	RCA type WR-39C Television Calibrator or equivalent.
OSCILLOSCOPE	RCA type WO-56A or equivalent.
VACUUM TUBE VOLTMETER (VTVM)	RCA type WV-97A or equivalent.
BIAS SOURCE	Three volt battery.
TEST CIRCUIT	Shown in Fig. 82A.
ISOLATION TRANSFORMER	150 watt rating or higher.

PROCEDURE

1. Connect all test equipment to a common ground. Connect the TV chassis to this same ground after installing an isolation transformer between the power line and the TV chassis. One side of the line cord connects directly to the TV chassis and an isolation transformer must be used for safety. Allow a 15 minute warm up period.

2. Set the AVC switch on the rear chassis apron to the 0-10 MILE (counterclockwise) position.

3. Connect the negative side of a 3 volt battery supply to pin 3 of test socket SO-101 or test point Ⓔ. Connect the positive side of the supply to the TV chassis.

4. Connect a VTVM to pin 2 of test socket SO-101 or test point Ⓓ through a 47,000 ohm carbon resistor. Connect the ground side of the meter to the TV chassis.

5. Connect the high side of a marker generator to the shield of the osc./mixer tube. This connection will capacitively couple the generator output to the tube. Make sure the shield is ungrounded by raising it above the grounded clips that hold it in place.

6. Set the channel selector to any vacant channel.

7. Set the marker generator output (unmodulated) for a two volt negative dc reading on the VTVM and adjust the three i-f transformers, L-9, and L-101 according to the I-F AMPLIFIER ALIGNMENT CHART shown below. Readjust the signal generator output as required to maintain the two volt VTVM reading.

I-F AMPLIFIER ALIGNMENT CHART

Signal Generator Frequency (No Modulation)	Adjustment	Location	VTVM Indication
25.4 MC	T-101 (bottom)	See Fig. 81A	Maximum
23.4 MC	T-102 (bottom)	Under Chassis	Maximum
24.5 MC	T-103 (bottom)	See Fig. 81A	Maximum
21.75 MC	T-102 (top)	See Fig. 81A	Minimum
23.4 MC	T-102 (bottom)	See Fig. 81A	Maximum
24.75 MC	*L-101	See Fig. 81A	Maximum
24.75 MC	#L-9	See Fig. 81A	Maximum

IMPORTANT -- Avoid resonating any of the coils with the iron core near the outer limit of its travel. The wax in the end of the coil forms holding the iron core in position may be softened for adjustment of the core by means of a heated screwdriver or a small pencil type soldering iron inserted into the wax. Remelt wax after adjustment.

* NOTE: On chassis with the 1E1345 Pentode and 1E1376 Cascode tuners, temporarily connect the series resistor-capacitor combination shown in Fig. 82A to the tuner test point TP-2 when making this adjustment. On chassis with the 1E1380 Cascode tuner, hold the channel selector between channels when making this adjustment.

#NOTE: Temporarily connect the series resistor-capacitor combination shown in Fig. 82A to the grid (pin 1) of V-101 the 6CB6 first i-f amplifier when making this adjustment.

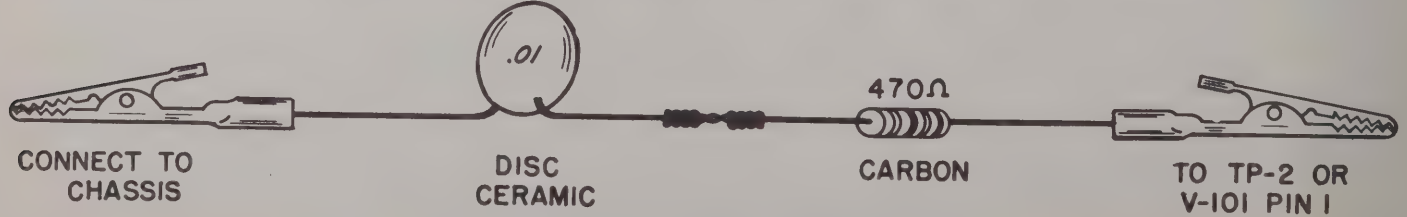

Fig. 82A. Test Circuit for I-F Amplifier Alignment

8. Disconnect the VTVM and marker generator connected in steps 4 and 5. The balance of the set-up should be as directed in steps 1, 2, 3 and 6.

9. Capacitively couple the high side of the sweep generator r-f output to the osc./mixer tube by connecting to the tube shield which has been raised above its grounding clips. The ground side of the sweep generator should be connected to the receiver chassis. Adjust the generator to sweep from 19 to 29 MC.

10. Loosely couple the high side of the marker generator to the high side of the sweep generator by clipping the marker generator r-f lead over the insulation of the sweep generator r-f lead. The ground side of the marker generator should be connected to the receiver chassis.

IMPORTANT - To prevent overloading of the i-f amplifier keep the output of the sweep and marker generators as low as possible. The marker generator output should be just high enough to produce visible pips on the pattern. In some cases the 21.75 MC pip will not be visible unless the r-f. output of the marker generator is increased to overcome the attenuation of the 21.75 MC signal by the trap in the top of T-102.

11. Connect the sweep output terminals on the sweep generator to the input of the horizontal amplifier in the oscilloscope.

12. Connect one side of a 47,000 ohm 1/2 watt resistor to test socket, SO-101, pin 2 or to test point Ⓓ shown in the schematic diagrams for chassis which do not have the test socket. Connect the other end of the resistor to the high side of the input terminals for the vertical amplifier in the oscilloscope. The scope ground terminal connects to the receiver chassis. Keep the scope leads away from the internal chassis wiring, particularly the horizontal output section.

13. Reduce the r-f output of the sweep generator and increase the gain of the vertical amplifier in the oscilloscope as much as possible without introducing an excessive amount of noise on the test pattern. This will prevent overloading of the i-f system.

14. Check the position of the markers shown in Fig. 84A. Adjust only the bottom cores of T-101, T-102 and T-103 for a response curve of maximum amplitude with a slightly tilted flat topped appearance as shown in Fig. 84A. This tilt is required to compensate for the capacitive coupling used for the signal generators. The actual response obtained will be flat when the pattern viewed on the oscilloscope has this tilt. The bottom core of T-103 will primarily control the tilt of this central portion of the curve.

    The bottom core of T-101 should be adjusted to position the 26.25 MC marker in the 50% position shown in Fig. 84A.

    The bottom core of T-102 should be adjusted to determine the slope of the curve between 21.75 MC and 23.4 MC with the 22.75 MC marker down 50% on the curve as shown in Fig. 84A.

    Under no circumstances should an attempt be made to adjust L-9, L-101 and the 21.74 MC trap in the top of T-102 by means of an oscilloscope and sweep generator. Maladjustment of these coils does not give a noticeable indication on the oscilloscope. Align these coils by following the procedure given in steps 1 through 7 only.

MEASUREMENT OF I-F AMPLIFIER, SENSITIVITY

To determine the i-f amplifier sensitivity, disconnect the r-f output lead from the tuner where it connects to L-101. Temporarily connect one side of a .005 mfd. ceramic or mica capacitor to grid pin 1 of the 6CB6 first i-f amplifier tube V-101. Connect the unmodulated r-f output of a marker generator to the other side of the capacitor and the ground side of the generator to the TV chassis. Set the marker generator to 24.75 MC. Connect a VTVM as directed in step 4 of the alignment procedure. The three volt battery must be removed. If a generator output of 200 to 400 microvolts produces a 1 volt reading on the VTVM, the i-f amplifier sensitivity is normal.

TELEVISION CHANNELS vs. CARRIER, OSCILLATOR AND I-F FREQUENCIES

Channel No.	Channel Freq. (mc)	Picture Carrier Freq. (mc)	Sound Carrier Freq. (mc)	Receiver Osc. Freq. (mc)	Picture I-F Freq. (mc)	Sound I-F Freq. (mc)	Picture I-F less Sound I-F (mc)
2	54-60	55.25	59.75	81.5	26.25	21.75	4.5
3	60-66	61.25	65.75	87.5	26.25	21.75	4.5
4	66-72	67.25	71.75	93.5	26.25	21.75	4.5
5	76-82	77.25	81.75	103.5	26.25	21.75	4.5
6	82-88	83.25	87.75	109.5	26.25	21.75	4.5
7	174-180	175.25	179.75	201.5	26.25	21.75	4.5
8	180-186	181.25	185.75	207.5	26.25	21.75	4.5
9	186-192	187.25	191.75	213.5	26.25	21.75	4.5
10	192-198	193.25	197.75	219.5	26.25	21.75	4.5
11	198-204	199.25	203.75	225.5	26.25	21.75	4.5
12	204-210	205.25	209.75	231.5	26.25	21.75	4.5
13	210-216	211.25	215.75	237.5	26.25	21.75	4.5

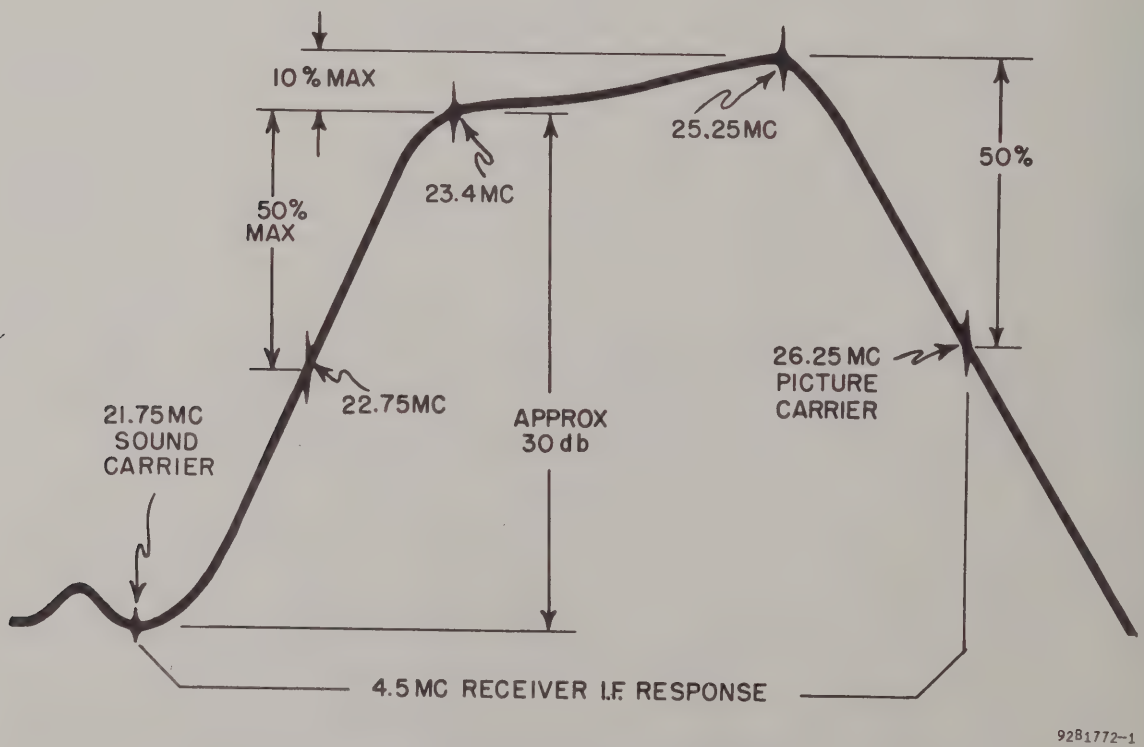

Fig. 84A. Typical I-F Amplifier Response

ALIGNMENT FOR 1C1345 PENTODE & 1C1376 CASCODE TV TUNERS

These tuners have been carefully aligned at the factory by personnel using precision equipment. Minor alignment adjustments of the tuner may be necessary after making tube or part replacements. When replacing tubes in a tuner use the same tube type as the original tube which was removed from the tuner and also try several different tubes and select the one which gives best performance. Realignment of the tuner probably will not be required if a selected tube is used for replacement. Use of an alternate tube may require a complete realignment of the TV tuner. For those service engineers who are properly equipped as specified, the following alignment procedure is included. Balance of TV receiver must be functioning properly before aligning tuner.

EQUIPMENT REQUIRED FOR TV TUNER ALIGNMENT

1. Sweep generator_____ RCA type WR-59B or equiv.
2. Marker Generator_____ RCA type WR-39C Television Calibrator or equivalent.
3. Oscilloscope _____ RCA type WO-56A or equiv.
4. Bias Source _____ 1.5 volt battery.
5. Isolation Transformer_____ 150 watt rating or higher

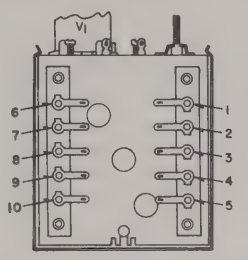

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Fig. 85A. Numbering of Tuner Terminals

SET-UP PROCEDURE FOR TUNER ALIGNMENT

1. Check to be sure that the tube shields and the bottom cover for the tuner are in place.

2. Connect all test equipment and the television chassis to a common ground. Be sure to use an isolation transformer for the receiver chassis. Allow at least a 5 minute warm-up period for the receiver chassis.

3. Connect the negative terminal of a 1.5 volt bias source to terminal 8 of the TV tuner. See Fig. 85A for terminal numbering. Connect the positive side of the bias source to any convenient ground point on the chassis.

4. Connect the hot lead from the oscilloscope through a 10,000 ohm carbon resistor to test point T.P.-1. Connect the ground lead from the oscilloscope to any convenient ground point on the TV tuner chassis. Set the scope sweep oscillator to roughly 120 cycles.

OSCILLATOR ADJUSTMENT

1. Turn the channel selector to channel 13.

2. Set the marker generator to 237.5 mc. and connect generator leads to the antenna terminals.

3. Rotate the fine tuning control until a zero beat is indicated on the scope. When the fine tuning control is rotated a band will appear across the face of the scope. As the point of zero beat is approached this band will increase in amplitude and then decrease sharply until a minimum is reached which is the point of zero beat. If the fine tuning control is rotated farther in the same direction the amplitude of the band will increase sharply and then decrease. The point of zero beat should fall in the approximate center of the range over which the fine tuning control may be rotated. If it does not, set the fine tuning control at the approximate center of its range and adjust L-7 (Channel 13 Oscillator Adjustment) for the zero beat. Do not disturb the setting of the fine tuning control after this adjustment.

4. Set the channel selector to channel 6.

5. Set the marker generator to 109.5 mc.

6. Adjust L-8 (Channel 6 Oscillator Adjustment) for the zero beat indication on the scope.

NOTE: Adjustment of the channel 13 and channel 6 oscillator coils automatically brings all other channel into adjustment. The adjustment screws cover their entire electrical range within eight full revolutions counterclockwise from the tight position. Any further rotation of these screws may cause them to fall out. Counterclockwise rotation of the screws will decrease the oscillator frequency. Best results will be obtained if a non-metallic screwdriver is used.

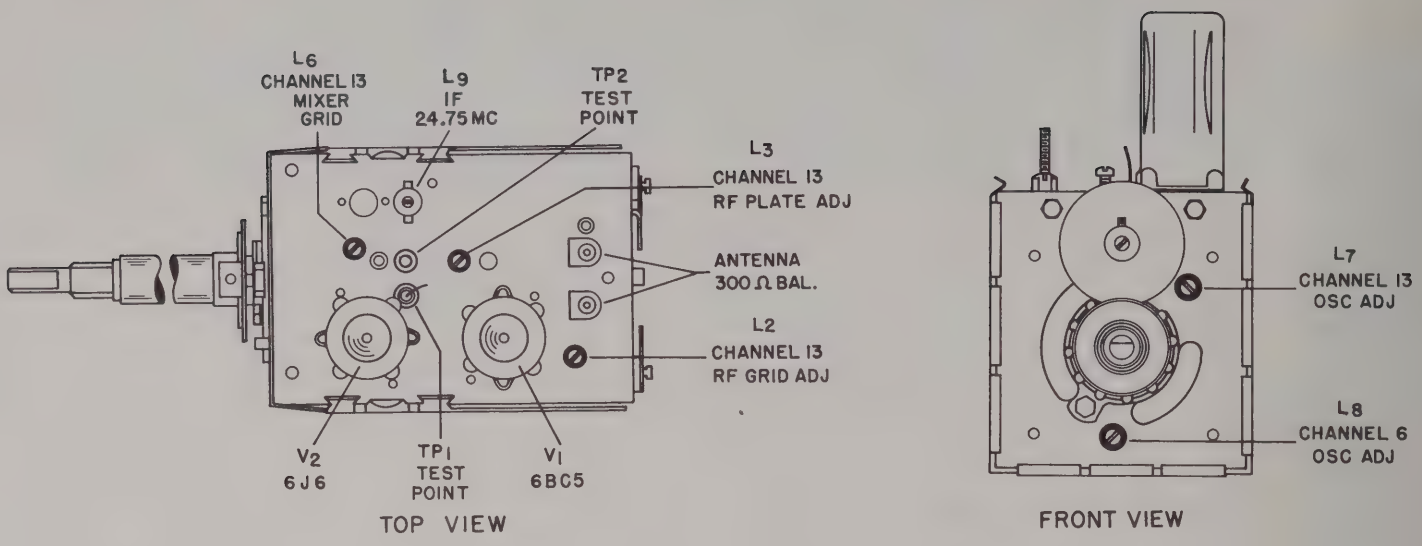

Fig. 86 1C1345 Pentode TV Tuner Alignment Adjustments

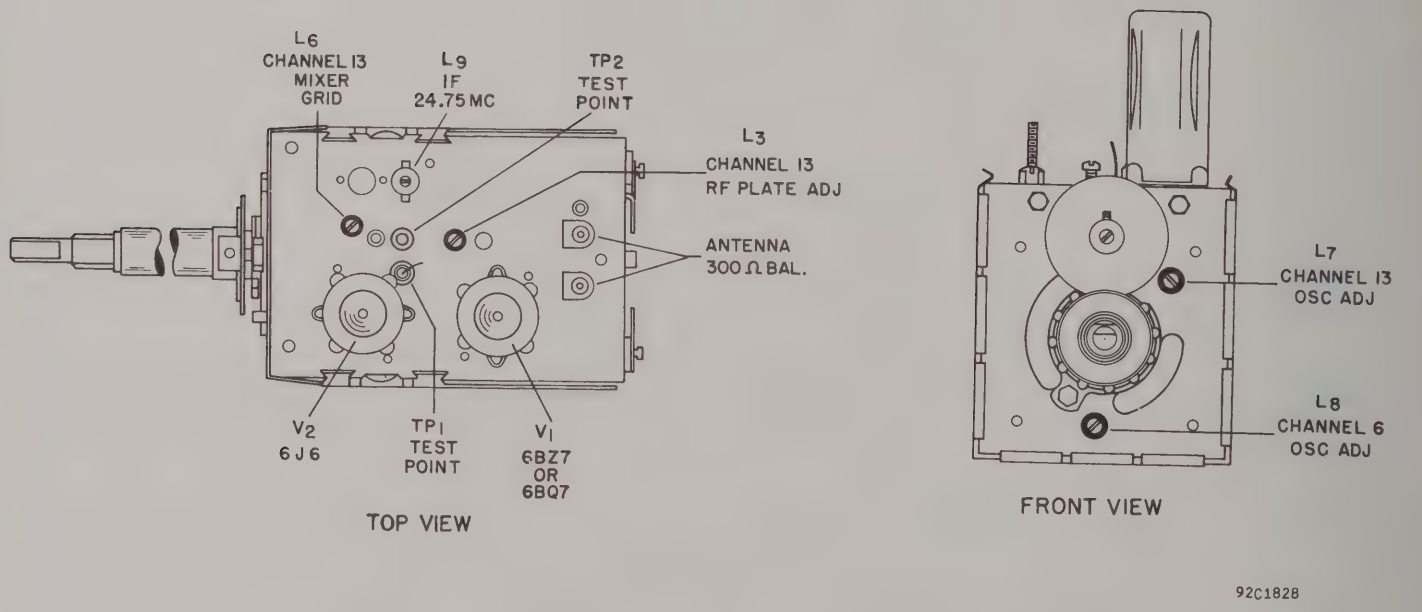

Fig. 86B. 1C1376 Cascode TV Tuner Alignment Adjustments

BAND PASS ALIGNMENT OF 1C1345 & 1C1376 TV TUNERS

CAUTION: Band pass alignment is carefully made at the factory. Attempt this alignment only with proper equipment and set-up. The tube shields and the bottom cover for the tuner must be in place. The oscillator adjustment given on page 1952-86 must be completed before the band pass alignment is started.

1. Complete the set-up procedure given on page 1952-85.

2. Connect the leads from the sweep and marker generators to the tuner antenna terminals.

3. Turn the channel selector to channel 13. Adjust the generators to the correct frequencies for channel 13 as shown in the chart on page 1952-84.

4. Adjust L-3 (channel 13 rf plate), L-2 (channel 13 rf grid), and L-6 (channel 13 mixer grid) adjusting screws (see Fig. 86A or 86B for a band pass characteristic containing both carriers with steep sides and maximum gain. The 1C1376 cascode tuners do not require adjustment of the channel 13 rf grid coil (L-2) and hence a screw for this adjustment will not be found on the top of these tuners.

If the factory adjustment of the incremental loops and coils has not been disturbed, alignment of the rf plate, rf grid, and mixer grid should be complete after the completion of step 4 unless extensive repairs have been made on the tuner. Check the other channels for a similar band pass characteristic as shown in Fig. 87A. If they have the correct characteristics further alignment is not necessary. If they do not, procede with step 5. When aligning the 1C1376 cascode tuners it will first be necessary to repeat step 4 and adjust L-2 by spreading or compressing the turns of the coil before continuing with steps 5 and 6.

5. Adjust the coils of the rf plate, rf grid, and mixer grid for channels 12 through 7 starting with channel 12. Adjust the signal generators for each channel to the frequencies given in the chart on page 1952-84. Pushing the half turn coil loops towards the center of the switch so that they are closer to the switch wafer will increase the frequency while pulling them out and away from the switch wafer will decrease the frequency. Adjust for a band pass characteristic containing both carriers with steep sides and maximum gain.

6. Adjust the coils of the rf plate, rf grid, and mixer grid for channels 6 through 2 starting with channel 6. Adjust the signal generators for each channel to the frequencies given in the chart on page 1952-84. Spreading the turns of the coils will increase the frequency while squeezing the turns together will decrease the frequency. Adjust for a band pass characteristic containing both carriers with steep sides and maximum gain. A tuning wand may be used to determine what change is necessary.

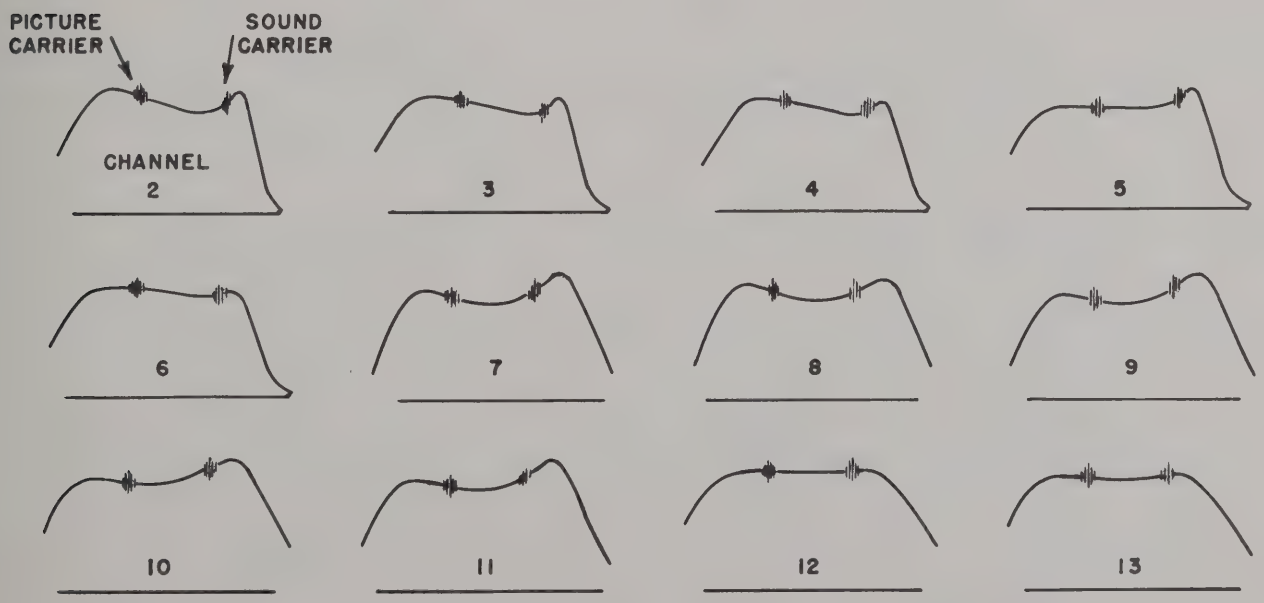

Fig. 87A. Typical Channel Response Curves for TV Tuners

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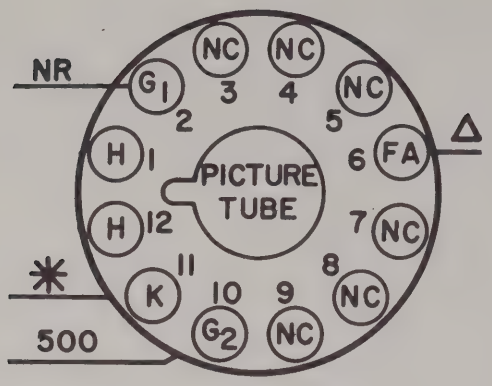

✳ 30 BRIGHTNESS MAX
150 BRIGHTNESS MIN

△ 0 FOCUS CONTROL MIN
500 FOCUS CONTROL MAX

PICTURE TUBE LEAD COLOR CODE		
PIN NO	COLOR	ELEMENT
1	BLACK	HEATER & GND.
2	GREEN	GRID
6	BLUE	FOCUS GRID
10	RED	ANODE GRID
11	YELLOW	CATHODE
12	BROWN	HEATER

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Fig. 88A. Picture Tube Socket Voltages

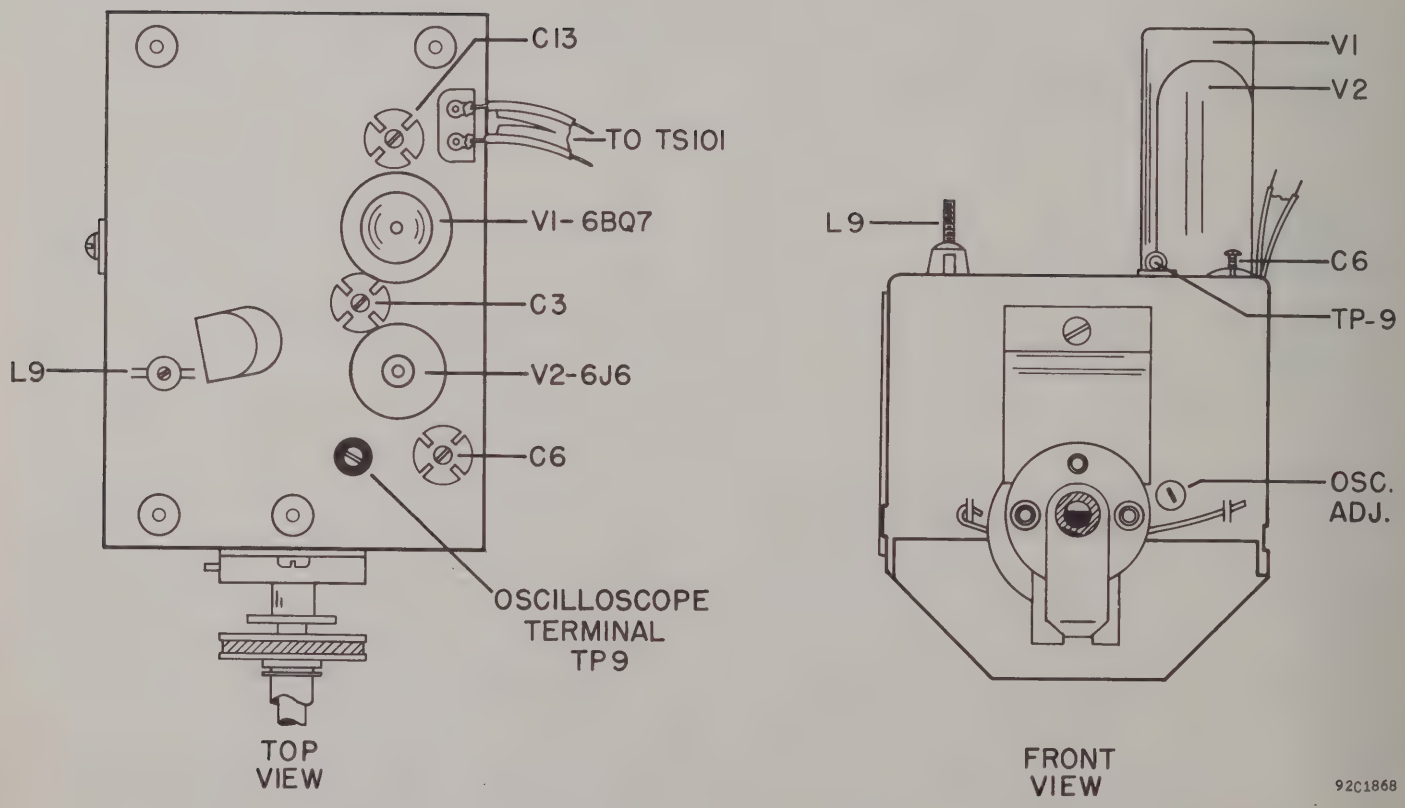

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Fig. 88B. 1E1380 Cascode TV Tuner Alignment Adjustments

1E1380 CASCODE TV TUNER ALIGNMENT (ANT. & RF CIRCUITS)

The tuner was carefully aligned at the factory and should not require complete realignment under normal operating conditions. A slight readjustment of the individual oscillator slugs may be required as the tubes in the tuner age or are replaced. In some rare cases it will be necessary to realign the tuner after replacing either of the two tubes. If any service work is performed on the tuner, realignment may or may not be required. NO ATTEMPT TO REALIGN THE TUNER SHOULD BE MADE UNTIL THE BALANCE OF THE TV RECEIVER IS KNOWN TO BE IN PROPER OPERATING CONDITION AND IS PROPERLY ALIGNED.

EQUIPMENT REQUIRED

1. Sweep generator covering all 12 television channels.
2. Marker generator covering the same range as the sweep generator.
3. Oscilloscope.
4. Vacuum tube voltmeter (VTVM).

SET-UP PROCEDURE

1. Set the CHANNEL SELECTOR switch to channel 12.
2. Connect the vertical amplifier input of the oscilloscope through a 10,000 ohm resistor to test point TP-9 on the tuner. (See Schematic Diagram and Fig. 88B). The horizontal amplifier in the oscilloscope should be connected to the oscilloscope sweep voltage output from the sweep generator.
3. Connect the negative pole of a 1.5 volt dry cell to the terminal where the AGC lead (white wire) from the tuner is connected. (Connect the positive pole of the dry cell to the receiver chassis. (See Schematic Diagram).
4. Set the FINE TUNING control at the approximate midpoint of its tuning range.
5. Connect the sweep generator to the antenna terminals and adjust to sweep channel 12. Keep the output of the sweep generator as low as possible to prevent overloading the r-f stage.
6. Loosely couple the r-f output from the marker generator to the antenna terminals. Use the minimum amount of coupling and signal from the marker generator required to give a good marker or pip on the oscilloscope pattern.

ANTENNA AND RF CIRCUIT ALIGNMENT

7. Adjust C-13, C-3 and C-6 for a flat-top response curve and maximum gain. Check markers on all channels. They should fall in automatically on each channel. Correct marker frequencies for each channel are given in the Picture Carrier and Sound Carrier columns of the chart on page 1952-84. Refer to Fig. 87.
8. Disconnect the battery used to obtain negative bias.
9. Disconnect the test equipment and air check the receiver on all active channels. If it is possible to receive a normal picture on all active channels by adjusting the FINE TUNING control, further alignment will not be necessary.

1E1380 CASCODE TV TUNER ALIGNMENT (OSC. CIRCUIT)

1. Set the FINE TUNING control at the approximate midpoint of its tuning range.
2. Place a non-metallic screwdriver through the openings provided in the front of the chassis and the tuner assembly and adjust the oscillator coil slug for each active channel to give the best possible picture.

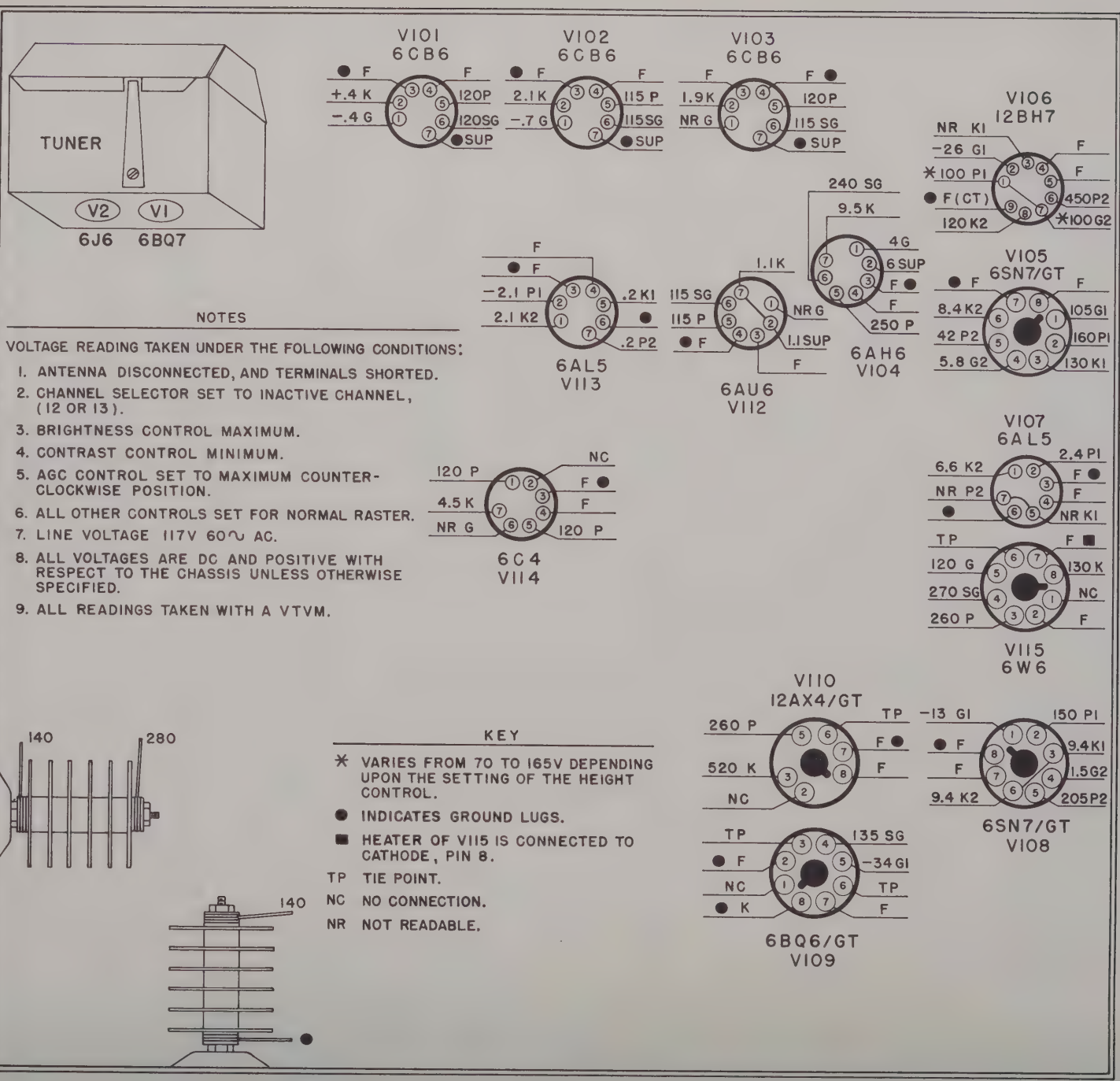
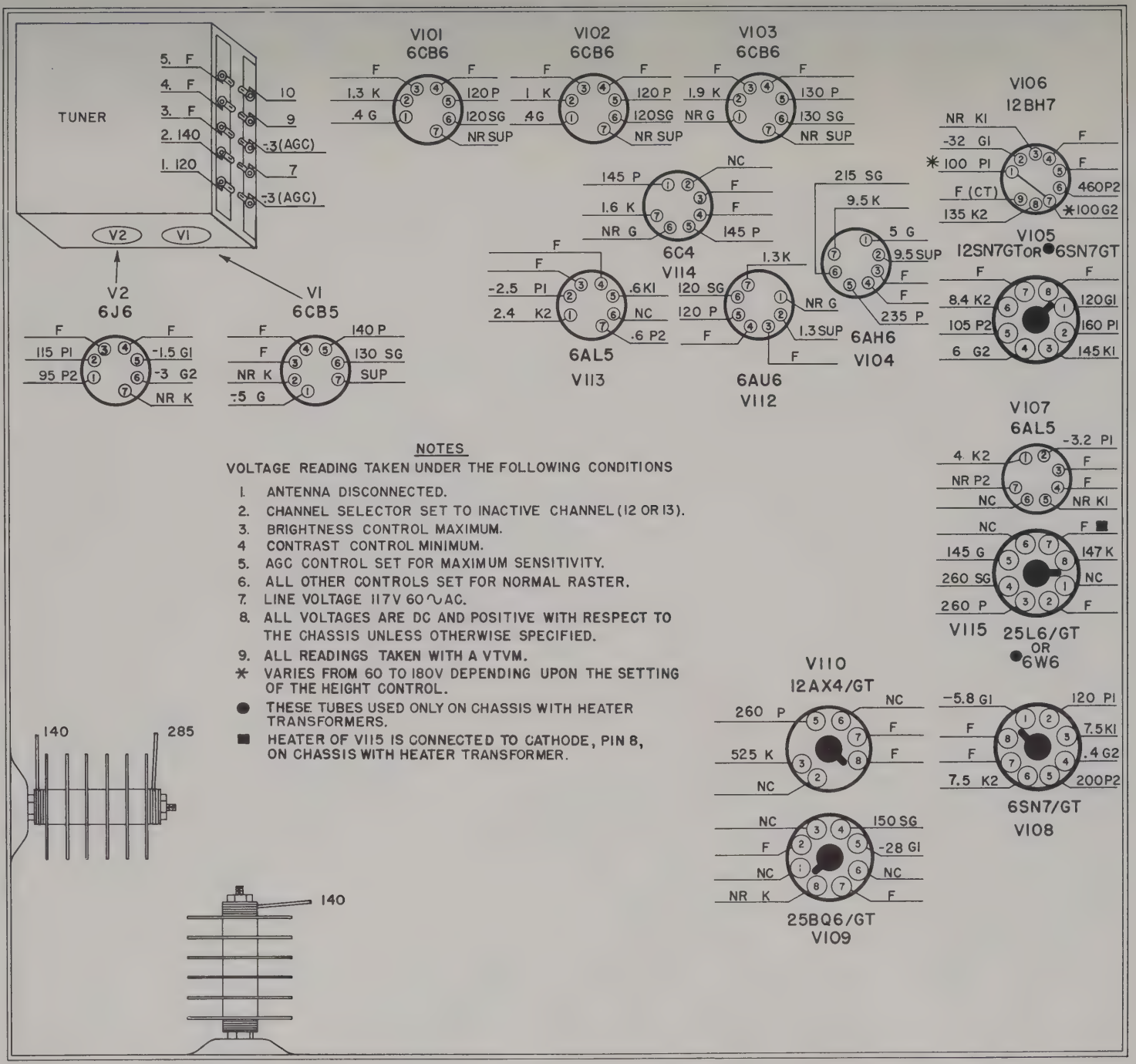


Fig. 88BA. Voltage Chart for 21" Chassis with 1E1380 Cascode Tuner

92C1869



NOTES

VOLTAGE READING TAKEN UNDER THE FOLLOWING CONDITIONS

1. ANTENNA DISCONNECTED.
2. CHANNEL SELECTOR SET TO INACTIVE CHANNEL (12 OR 13).
3. BRIGHTNESS CONTROL MAXIMUM.
4. CONTRAST CONTROL MINIMUM.
5. AGC CONTROL SET FOR MAXIMUM SENSITIVITY.
6. ALL OTHER CONTROLS SET FOR NORMAL RASTER.
7. LINE VOLTAGE 117V 60 ∿ AC.
8. ALL VOLTAGES ARE DC AND POSITIVE WITH RESPECT TO THE CHASSIS UNLESS OTHERWISE SPECIFIED.
9. ALL READINGS TAKEN WITH A VTVM.

* VARIES FROM 60 TO 180V DEPENDING UPON THE SETTING OF THE HEIGHT CONTROL.

● THESE TUBES USED ONLY ON CHASSIS WITH HEATER TRANSFORMERS.

■ HEATER OF V115 IS CONNECTED TO CATHODE, PIN 8, ON CHASSIS WITH HEATER TRANSFORMER.

Fig. 89A. Voltage Chart for 17" Chassis with 1C1345 Pentode Tuner

92C1738-2

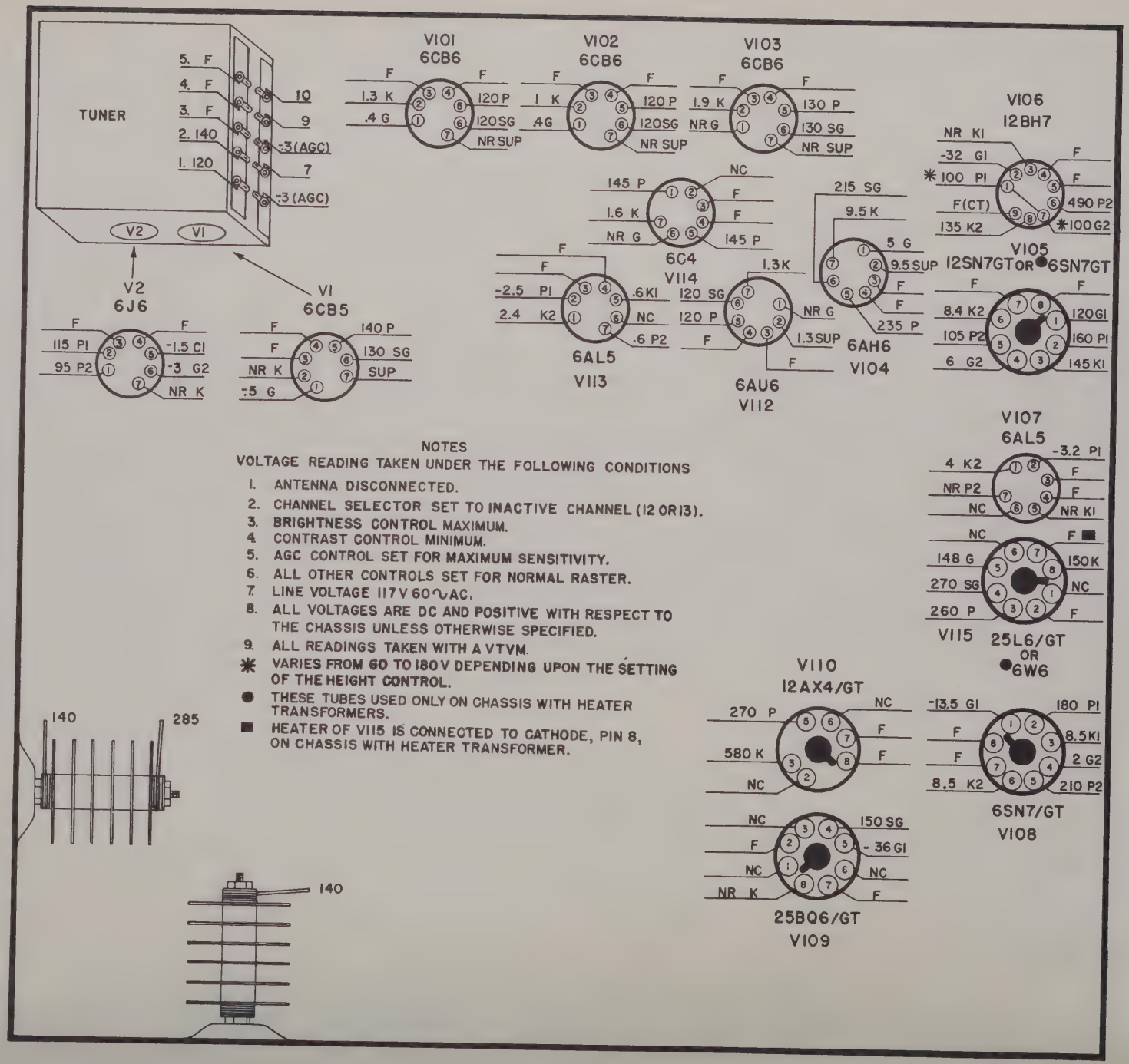
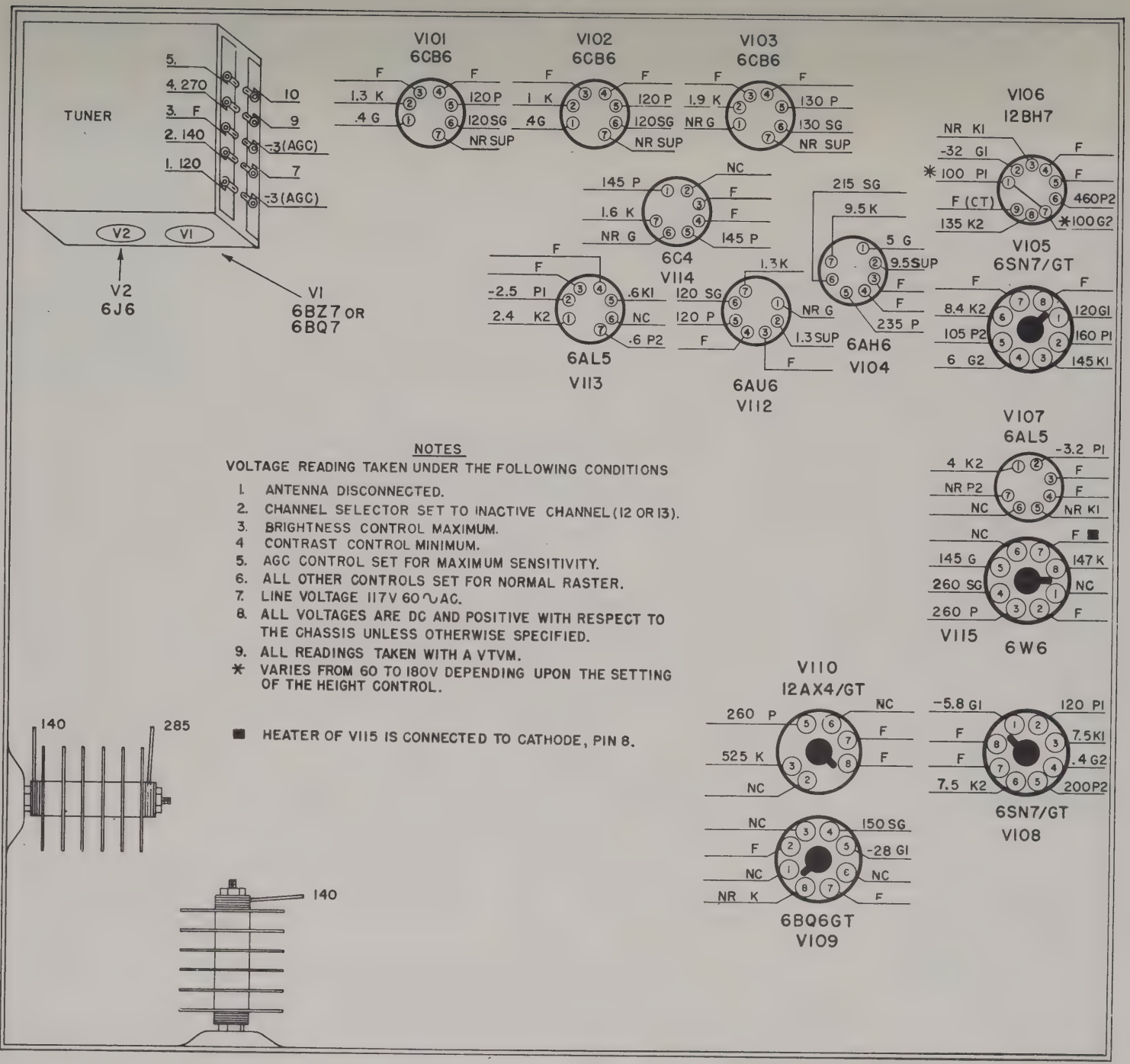


Fig. 90A. Voltage Chart for 20" or 21" Chassis with 1C1345 Pentode Tuner

92C1796-2

94X955-3
1052



NOTES

VOLTAGE READING TAKEN UNDER THE FOLLOWING CONDITIONS

1. ANTENNA DISCONNECTED.
2. CHANNEL SELECTOR SET TO INACTIVE CHANNEL (12 OR 13).
3. BRIGHTNESS CONTROL MAXIMUM.
4. CONTRAST CONTROL MINIMUM.
5. AGC CONTROL SET FOR MAXIMUM SENSITIVITY.
6. ALL OTHER CONTROLS SET FOR NORMAL RASTER.
7. LINE VOLTAGE 117V 60 ∿ AC.
8. ALL VOLTAGES ARE DC AND POSITIVE WITH RESPECT TO THE CHASSIS UNLESS OTHERWISE SPECIFIED.
9. ALL READINGS TAKEN WITH A VTVM.

* VARIES FROM 60 TO 180V DEPENDING UPON THE SETTING OF THE HEIGHT CONTROL.

■ HEATER OF V115 IS CONNECTED TO CATHODE, PIN 8.

Fig. 89AA. Voltage Chart for 17" Chassis with 1C1376 Cascode Tuner

92C1838-1

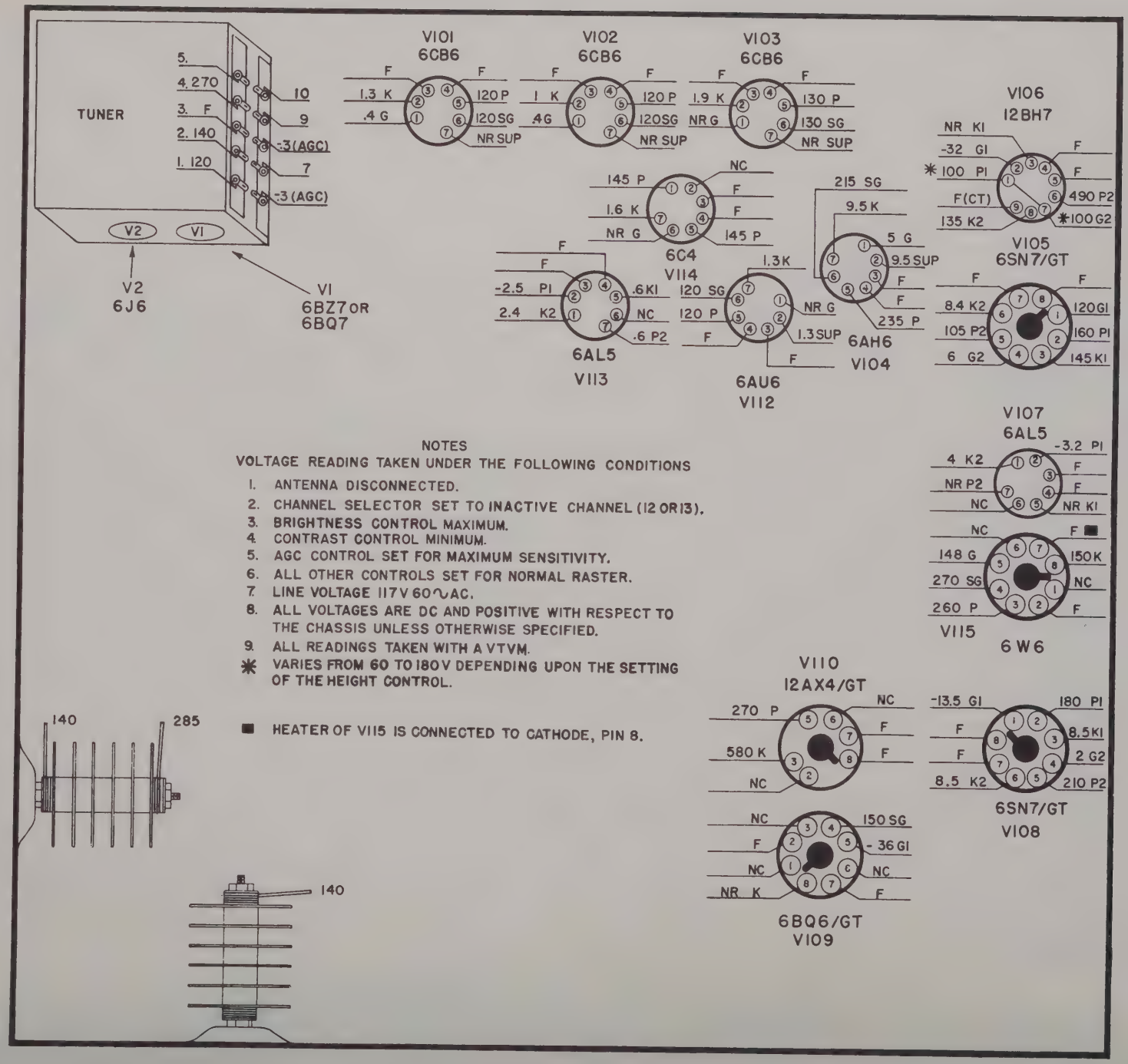


Fig. 90AA. Voltage Chart for 20" or 21" Chassis with 1C1376 Cascode Tuner

92C1839-1

TYPICAL OSCILLOSCOPE PATTERNS

The patterns given on the following pages are presented as a guide when using an oscilloscope to locate trouble in the video amplifier, sync., horizontal oscillator, horizontal output, vertical oscillator, and vertical output stages of the television receiver.

Considerable variation may be noted in the amplitude and shape of some of the various waveforms from one receiver to the next. As long as the waveform obtained from the receiver under test contains the same general characteristics as those shown in the illustrations and the relative amplitude is within approximately 25% of the peak to peak voltage or relative amplitude shown below each waveform the pattern obtained may be assumed to be correct. The patterns are observed with the tv receiver tuned to an active channel and the controls adjusted for the best possible picture. The line voltage should be set to 117 volts.

The waveforms shown in the illustrations were obtained on a Dumont type 304 oscilloscope which was used in conjunction with a low capacity 10 to 1 probe such as the Tel-Instrument Co. type 1610. Other types of oscilloscopes will account for a certain amount of variation in the amplitude and shape of the patterns obtained from the actual receiver under test. A low capacity probe must be used in order to obtain satisfactory results. A power line isolation transformer should also be used for safety since the chassis is "hot".

With the exception of the test patterns obtained across the vertical yoke and horizontal yoke all patterns are taken with the ground side of the oscilloscope connected to the ground or chassis of the tv receiver and the 10 to 1 probe connected to the specific points in the tv chassis as specified by each pattern.

The patterns obtained from the horizontal amplifier plate, damper cathode, horizontal deflection yoke, and the high voltage rectifier tube must be observed by means of the high voltage probe which is made from a type 1X2-A tube as shown in Fig. 94A. The tube is used as a high voltage coupling capacitor. Use a new tube for this application because the loose filament of a burned out one may touch the plate and damage the probe or input circuit of the scope. These patterns are shown with their relative amplitudes indicated with respect to the pattern obtained at pin 3 (cathode) of the damper tube (V-110) which is given a unit value of one.

At certain points throughout the tv receiver the oscilloscope pattern obtained will be dependent upon the frequency of the horizontal sweep oscillator in the oscilloscope. The oscilloscope sweep frequency must be either 30 cps (1/2 of the tv vertical oscillator frequency) or 7875 cps (1/2 of the tv horizontal oscillator frequency) depending upon the pattern desired. The sweep frequency required to obtain the patterns shown is given with each pattern.

VIDEO AMPLIFIER

92X1783-A

V-104
Video Amp.

Plate pin 5

Sweep Freq.
7875 cps

Voltage P/P
set 60 volts

Adjust the contrast control to give a 60 volt peak to peak reading. Do not change this setting when taking other waveforms.

SYNC. CLIPPER

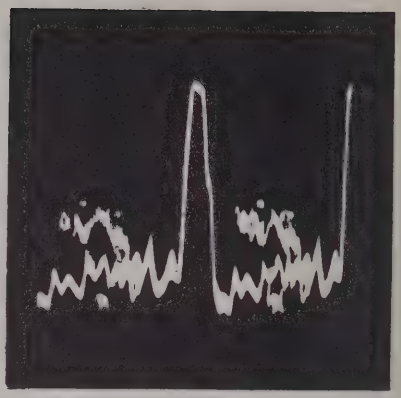
Before viewing the following waveforms set the contrast control for the 60 volt peak to peak reading and the pattern shown on page 1952-91.

V-105
Sync. Clip.

Grid Pin 1

Sweep Freq.
7875 cps

Voltage P/P
43 volts



92X1783-B

V-105
Sync. Clip.

Plate Pin 2

Sweep Freq.
7875 cps

Voltage P/P
34 volts

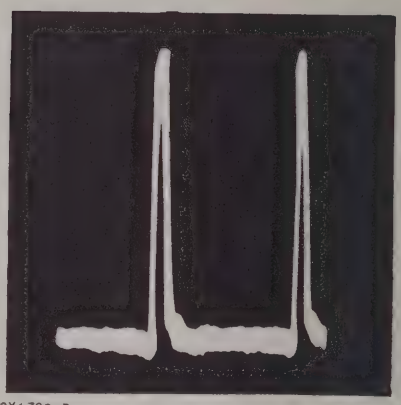
92X1783-C

V-105
Sync. Clip.

Plate Pin 5

Sweep Freq.
7875 cps

Voltage P/P
40 volts



92X1783-D

VERTICAL OSCILLATOR AND VERTICAL AMPLIFIER

Junction of
R-133, R-134
& C-126

Sweep Freq.
30 cps

Voltage P/P
47 volts

92X1783-E

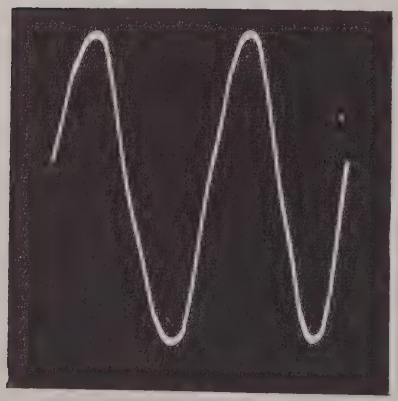
V-106A
Vert. Osc.

Grid Pin 2

Sweep Freq.
30 cps

Voltage P/P
180 volts

92X1783-F



V-106A
Vert. Osc.

Cath. Pin 4

Sweep Freq.
30 cps

Voltage P/P
110 volts

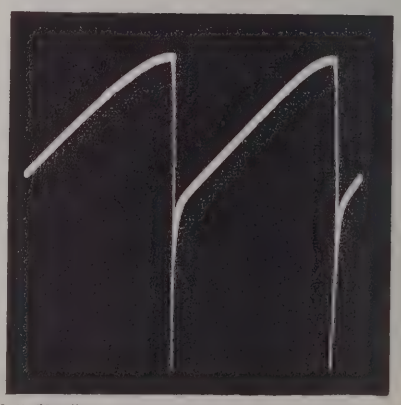
92X1783-G

V-106B
Vert. Out.

Grid Pin 7

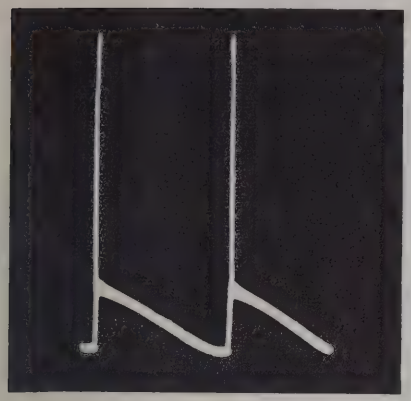
Sweep Freq.
30 cps

Voltage P/P
90 volts.



92X1783-H

VERTICAL OSCILLATOR AND VERTICAL AMPLIFIER (Cont.)



92X1783-I

V-106B
Vert. Out.

Plate Pin 6

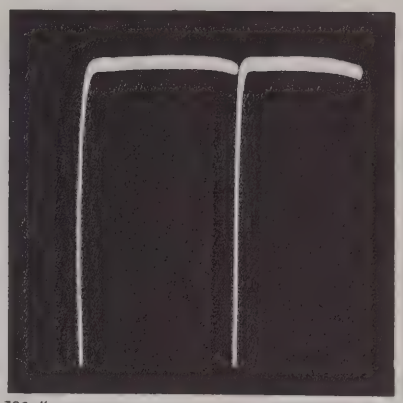
Sweep Freq.
30 cps

Voltage P/P
1500 volts

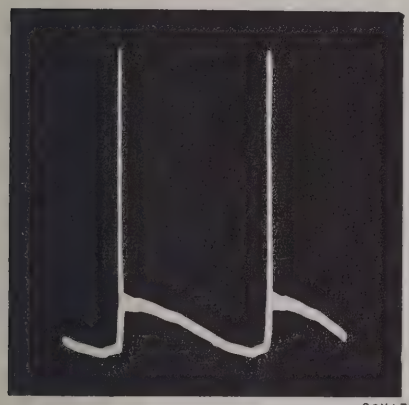
V-116
Pix Tube

Grid Pin 2
Green Lead
Sweep Freq.
30 cps

Voltage P/P
14 volts



92X1783-K



92X1783-J

Across Vert.
Yoke

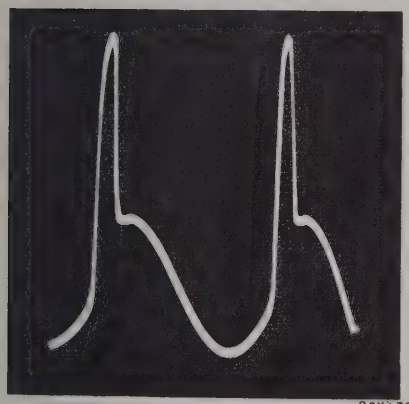
Green Leads

Sweep Freq.
30 cps

Voltage P/P
30 volts

NOTE: When observing this test pattern the oscilloscope must not be grounded since the ground side of the scope is connected to B+ of the power supply. Do not touch the tv chassis and the scope during this observation as a severe shock will result. The "hot" lead of the scope should be connected to the green wire and the other scope lead should be connected to the green wire with black tracer.

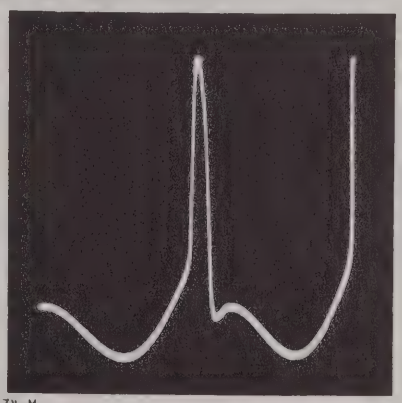
HORIZONTAL OSCILLATOR AND HORIZONTAL AMPLIFIER DRIVE



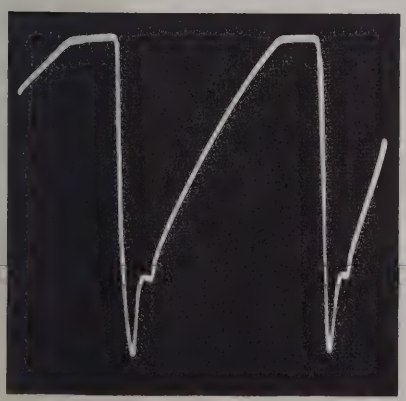
92X1784-L

V-108
Horiz. Osc.
Plate Pin 5
Sweep Freq.
7875 cps
Voltage P/P
For 17" chassis
34 volts
20"& 21" chassis
45 volts

V-108
Horiz. Osc.
Grid Pin 1
Sweep Freq.
7875 cps
Voltage P/P
For 17" chassis
28 volts
20"& 21" chassis
45 volts



92X1874-M



92X1784-N

V-108
Horiz. Osc.
Plate Pin 2
Sweep Freq.
7875 cps
Voltage P/P
For 17" chassis
95 volts
20"& 21" chassis
145 volts

V-109
Horiz. Out.
Grid Pin 5
Sweep Freq.
7875 cps
Voltage P/P
For 17" chassis
95 volts
20"& 21" chassis
140 volts

92X1784-O

HORIZONTAL AMPLIFIER, DAMPER AND HIGH VOLTAGE RECTIFIER

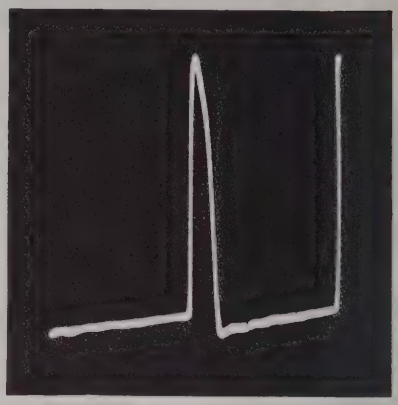
Before endeavoring to view the following waveforms read the notes and instructions at the beginning of this section pertaining to waveforms. The high voltage probe shown below must be used to prevent damage to the test equipment being used.

V-110
Damper

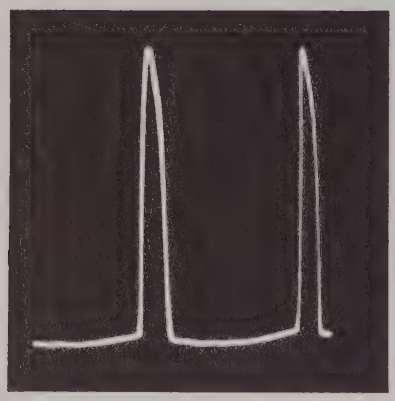
Cath. Pin 3

Sweep Freq.
7875 cps

Voltage Ratio
1 time



94X1784-Q



Across Horiz.
Yoke

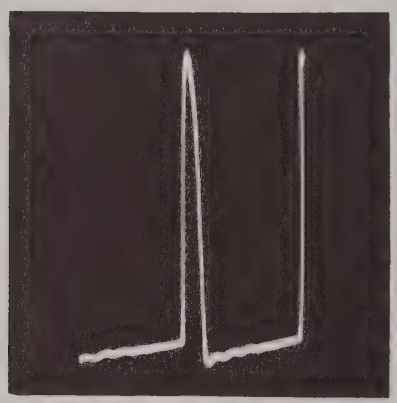
Red Wires

Sweep Freq.
7875 cps

Voltage Ratio
1 time

92X1784-S

NOTE: When observing this test pattern the oscilloscope must not be grounded since the ground side of the scope is connected to B+ of the power supply. Do not touch the tv chassis and the scope during this observation as a severe shock will result. The "hot" lead of the scope should be connected to the red wire and the other scope lead should be connected to the red wire with black tracer.



V-109
Horiz. Out.

Plate Cap

Sweep Freq.
7875 cps

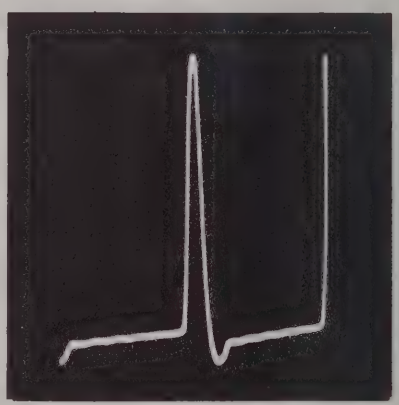
Voltage Ratio
1.7 times

92X1784-P

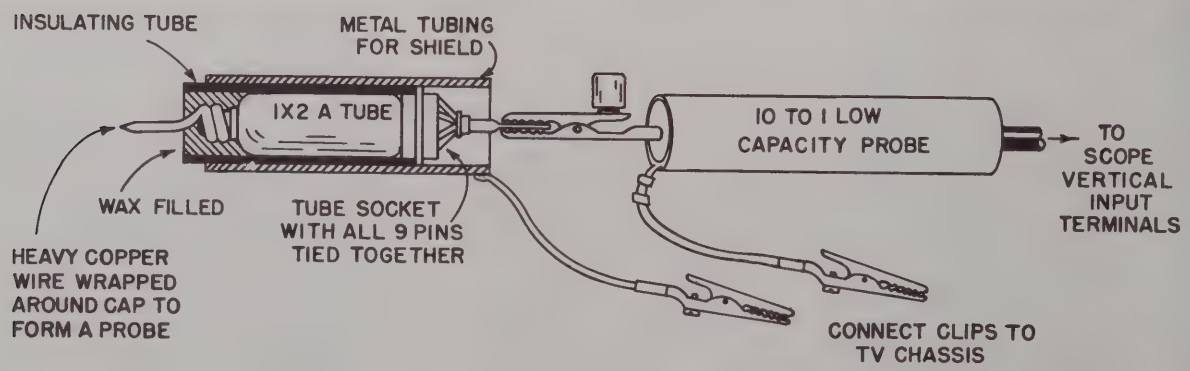
V-111
High Volt.
Rectifier
Plate Cap

Sweep Freq.
7875 cps

Voltage Ratio
5.5 times



92X1784-R



9281520

Fig. 94A. High Voltage Probe for Waveform Observations

SERVICE PARTS LIST

The following combined parts list may be used to determine replacement parts for the 1200 series TV chassis. To determine the correct replacement part, first refer to the correct schematic for the particular chassis involved and determine the correct schematic symbol for the part. Refer to the Service Parts List for the part number and description of the component with the same schematic symbol. Some components with the same schematic symbol vary from one type of chassis to another due to mechanical changes. These exceptions are also shown in the Service Parts List. As revised pages or supplementary data is received for this parts list be sure to immediately file the page or enter the data as instructed. Failure to do this may result in a wrong part being ordered or used for replacement. The part number will be found stamped on most components with the exception of carbon resistors, capacitors, tube sockets, and other small components not large enough to be stamped.

Picture tubes and their associated mounting components are listed in a separate parts list. Cabinet parts may be determined by referring to the pages devoted to individual models.

TRANSFORMERS AND COILS

Schematic Symbol	Description	Hallicrafters Part Number
T-101	Transformer, first i-f amplifier	50B561
T-102	Transformer, second i-f amplifier	50B568
T-103	Transformer, diode detector	50B562
T-104	Transformer, vertical blocking oscillator	55B190
T-105	Transformer, vertical output	55C192
T-106	Transformer, horizontal output (for 17" chassis)	55D193
T-107	Transformer, ratio detector	50C473
T-108	Transformer, audio output	55C191
T-109	Transformer, horizontal output (for 20 or 21" chassis)	55D197
T-110	Transformer, Heater	52C258
L-101	Coil, converter i-f	51B1301
L-102	Coil, video peaking	51A1578
L-103	Coil, video peaking	51A1579
L-104	Coil, video peaking (wound on R-119)	51A1580
L-105	Coil, 4.5 MC trap	51B1541
L-106	Coil, video peaking (wound on R-122)	51A1581
L-107	Coil, video peaking (wound on R-123)	51A1582
§L-108	Coil, horizontal stabilizer	51B1536
L-109	Coil, yoke coupling (wound on C-148)	51B1642 or 53B264
L-110	Coil, 4.5 MC amplifier grid adjustment	51B1542
L-111	Coil, speaker field (part of speaker)	---------
L-112	Deflection yoke (for 17" chassis)	53A271 or 53C263
L-112	Deflection yoke (for 20" chassis)	53A271 or 53A268
L-112	Deflection yoke (for 21" chassis)	53A271
L-113	Choke, heater	53A266
L-114	Choke, r-f (channel 5 tweet filter)	53B008

§ Either one of the two different horizontal stabilizer coils listed above for L-108 may be found in the 1200 series chassis. The 51B1642 coil is easily identified by the 63A902 aluminum plate which must be used for mounting this coil. Neither C-142 (75 mmf) nor C-170 (100 mmf) are required between pin 5 and ground of the horizontal oscillator when the 51B1642 coil is used.

SERVICE PARTS LIST (Cont.)

TUBES & RECTIFIER COMPLEMENT

Schematic Symbol	Description	Hallicrafters Part Number	
		CHASSIS WITH HEATER TRANSFORMER	CHASSIS WITH SERIES-PARALLEL HEATER CIRCUIT
V-1	R-F amplifier (part of tv tuner)	---------	---------
V-2	Oscillator/mixer (part of tv tuner)	---------	---------
V-101	First i-f amplifier	90X6CB6	90X6CB6
V-102	Second i-f amplifier	90X6CB6	90X6CB6
V-103	Third i-f amplifier	90X6CB6	90X6CB6
V-104	Video amplifier	90X6AH6	90X6AH6
V-105	Sync clipper	90X12SN7GT	90X6SN7GT
V-106	Vertical oscillator and output	90X12BH7	90X12BH7
V-107	Horizontal A.F.C.	90X6AL5	90X6AL5
V-108	Horizontal oscillator	90X6SN7GT	90X6SN7GT
V-109	Horizontal output	90X25BQ6GT	90X6BQ6GT
V-110	Damper	90X12AX4	90X12AX4
V-111	High voltage rectifier	90X1B3GT	90X1B3GT
V-112	Sound i-f amplifier (4.5 MC)	90X6AU6	90X6AU6
V-113	Ratio detector	90X6AL5	90X6AL5
V-114	Audio amplifier	90X6C4	90X6C4
V-115	Audio output amplifier	90X25L6GT/G	90X6W6
V-116	Picture tube -- See page 1952-103	----------	----------
X-101	Selenium rectifier (300 ma.)	27A173	27A173
X-102	Selenium rectifier (300 ma.)	27A173	27A173
X-103	Video detector (1N60 germanium diode)	19B1246	19B1246

TV TUNER UNIT

	A, D, K, L, P, R, W & X1200D CHASSIS	F, G & T1200D CHASSIS	J1200D CHASSIS
Tuning unit assembly, complete with tubes. Refer to part number stamped on top of tuner chassis.	1C1345 Pentode type with 90X6BC5 r-f amplifier and 90X6J6 oscillator/mixer.	1C1376 Cascode type with 90X6BZ7 or 90X6BQ7 r-f amplifier and 90X6J6 oscillator/mixer.	1E1380 Cascode type with 90X6BQ7 r-f amplifier and 90X6J6 oscillator/mixer.

SERVICE PARTS LIST (Cont.)

CAPACITORS

Schematic Symbol	Description	Hallicrafters Part Number
C-100	330 mmf. 500 V., ceramic tubular	47B20331M5
C-101	330 mmf. 500 V., ceramic tubular	47B20331M5
C-102	330 mmf. 500 V., ceramic tubular	47B20331M5
C-103	5000 mmf. 500 V., ceramic disc	47A168
C-104	Dual 4000 mmf. 500 v., ceramic disc	47A218
C-105	1000 mmf. 500 V., ceramic disc	47A230
C-106	5000 mmf. 500 V., ceramic disc	47A168
C-107	5000 mmf. 500 V., ceramic disc	47A168
C-108	1000 mmf. 500 V., ceramic disc	47A230
C-109	5000 mmf. 500 V., ceramic disc	47A168
C-110	5000 mmf. 500 V., ceramic disc	47A168
C-111	1000 mmf. 500 V., ceramic disc	47A230
C-112	10 mmf. 500 V., ceramic tubular	47B20100K5
*C-113	4.7 mmf. 500 V., 10% ceramic tubular	47A160-6
C-114	.1 mfd. 200 V., paper tubular	46AU104J
C-115	.5 mfd. 25 V., paper tubular	46A177
*C-116	2.2 mmf. 500 V., 10% ceramic tubular	47A160-4
*C-117	30 mmf. 500 V., 10% ceramic tubular	47X20PG300K5
C-118	100-10 mfd. 300 V., 200-30 mfd. 150 V., electrolytic	45C209
C-119	200-5 mfd. 150 V., electrolytic.	45C210
C-120	5000 mmf. 500 V., ceramic disc	47A168
C-121	.1 mfd. 400 V., paper tubular	46AV104J
*C-122	220 mmf. 500 V., 10% ceramic tubular	47B20221K5
C-123	.005 mfd. 600 V., paper tubular	46AY502J
C-124	22 mmf. 500 V., ceramic tubular	47B20220M5
C-125	.05 mfd. 400 V., paper tubular	46AW503J
C-126	.0047 mfd. 400 V., molded paper tubular	46BS472L4
C-127	.0047 mfd. 400 V., molded paper tubular	46BS472L4
C-128	.01 mfd. 400 V., molded paper tubular	46BS103L4
C-129	.0047 mfd. 400 V., molded paper tubular.	46BS472L4
C-130	.047 mfd. 400 V., molded paper tubular	46BS473L4
C-131	.047 mfd. 400 V., molded paper tubular	46BS473L4
C-132	5000 mmf. 500 V., ceramic disc	47A168
C-133	20 mfd. 450 V., electrolytic	45B208
C-134	.05 mfd. 200 V., paper tubular	46AU503J
C-135	140 mfd. 150 V., electrolytic	45B207
*C-136	1000 mmf. 500 V., ceramic tubular	47B20A102M5
*C-137	1000 mmf. 500 V., ceramic tubular	47B20A102M5
C-138	.006 mfd. 600 V., paper tubular	46AZ602F
*C-139	.003 mfd. 400 V., paper tubular	46AW302J
*C-140	.001 mfd. 1000 V., molded paper tubular	46BS102L10
C-141	.01 mfd. 400 V., paper tubular	46AW103J
§*C-142	75 mmf. 500 V., 10% ceramic tubular	47B20750K5
*C-143	3900 mmf. 500 V., 10% silver mica	47X30D392K
*C-144	390 mmf. 500 V., 10% silver mica	47X20D391K
*C-145	470 mmf. 500 V., 10% silver mica	47X20D471K
C-146	5000 mmf. 500 V., ceramic disc	47A168
*C-147	120 mmf. 3000 V., ceramic disc	47A296
C-148	.1 mfd. 200 V., paper tubular (part of L-109)	---
*C-149	68 mmf. 500 V., 10% ceramic tubular	47X20TH680K5
C-150	Dual 4000 mmf. 500 V., ceramic disc	47A218
C-151	5 mfd. 50 V., electrolytic	45B175
C-152	330 mmf. 500 V., ceramic tubular	47B20331M5
C-153	1000 mmf. 500 V., ceramic disc	47A230
C-154	5000 mmf. 500 V., ceramic disc	47A168

* USE EXACT REPLACEMENT PART ONLY

§ SEE NOTE ON BOTTOM OF PAGE 1952-95.

SERVICE PARTS LIST (Cont.)

CAPACITORS (Cont.)

Schematic Symbol	Description	Hallicrafters Part Number
C-155	10 mfd. 50 V., electrolytic	45B211
C-156	.01 mfd. 400 V., paper tubular	46AW103J
C-157	.02 mfd. 600 V., paper tubular	46AY203J
C-158	5000 mmf. 500 V., ceramic disc	46A168
C-159	5000 mmf. 500 V., ceramic disc	46A168
C-160	47 mmf. 2000 V., (part of L-112)	---
*C-161	200 mfd. 150 V., electrolytic	45B217
C-162	.1 mfd. 600 V., paper tubular	46AY104J
*C-163	390 mmf. 500 V., 10% silver mica	47X20D391K
*C-164	560 mmf. 500 V., 10% silver mica	47X20D561K
C-165	.047 mfd. 400 V., paper tubular	47BS473L4
C-166	500 mmf. 20,000 V., ceramic	47A308
C-167	.005 mfd. 400 V., paper tubular	46AW502H
C-168	.05 mfd. 400 V., paper tubular	46AW503H
C-169	10 mfd. 150 V., electrolytic	45A097
§*C-170	100 mmf. 500 V., silver mica	47X20D101K

* USE EXACT REPLACEMENT PART ONLY
§ SEE NOTE ON BOTTOM OF PAGE 1952-95.

SERVICE PARTS LIST (Cont.)

RESISTORS

Schematic Symbol	Description	Hallicrafters Part Number
R-100	5 ohm hum balance rheostat (part of speaker)	---------
R-101	100,000 ohms ½ watt, carbon	23X20X104K
R-102	4700 ohm ½ watt, carbon	23X20X472K
R-103	1000 ohms ½ watt, carbon	23X20X102K
R-104	47 ohms ½ watt, carbon	23X20X470K
R-105	1000 ohms ½ watt, carbon	23X20X102K
R-106	10,000 ohms ½ watt, carbon	23X20X103K
R-107	47 ohms ½ watt, carbon	23X20X470K
R-108	1000 ohms ½ watt, carbon	23X20X102K
R-109	8200 ohms ½ watt, carbon	23X20X822K
R-110	150 ohms ½ watt, carbon	23X20X151K
R-111	1000 ohms ½ watt, carbon	23X20X102K
R-112	390,000 ohms ½ watt, carbon	23X20X394K
R-113	1.5 megohms ½ watt, carbon	23X20X155K
R-114	5600 ohms ½ watt, carbon	23X20X562K
R-115	1 megohm ½ watt, carbon	23X20X105K
R-116	1.5 megohms ½ watt, carbon	23X20X155K
R-117	2.2 megohms ½ watt, carbon	23X20X225K
R-118/168	2500/1,000,000 ohms; dual contrast/volume control	25B997
R-119	8200 ohms ½ watt, carbon (part of L-104)	---------
R-120	33,000 ohms 1 watt, carbon	23X30X333K
R-121	4700 ohms 2 watt, carbon	23X40X472K
R-122	6800 ohms ½ watt, carbon (part of L-106)	---------
R-123	3300 ohms ½ watt, carbon (part of L-107)	---------
R-124	10,000 ohms ½ watt, carbon	23X20X103K
R-125	470,000 ohms ½ watt, carbon	23X20X474K
R-126	2.2 megohms ½ watt, carbon	23X20X225K
R-127	680,000 ohms ½ watt, carbon	23X20X684K
R-128	2200 ohms ½ watt, carbon	23X20X222K
R-129	560,000 ohms 1 watt, carbon	23X30X564K
R-130	22,000 ohms ½ watt, carbon	23X20X223K
R-131	6800 ohms ½ watt, carbon	23X20X682K
R-132	3300 ohms ½ watt, carbon	23X20X332K
R-133	22,000 ohms ½ watt, carbon	23X20X223K
R-134	10,000 ohms ½ watt, carbon	23X20X103K
R-135	850,000 ohms; vertical hold control: for mtg. on rear apron	25B1001
R-135	850,000 ohms; vertical hold control: for mtg. on front apron	25B1013
R-136	3300 ohms ½ watt, carbon	23X20X332K
R-137	1800 ohms ½ watt, carbon	23X20X182K
R-138	5 megohms; height control	25B998
R-139	120 ohms ½ watt, carbon	23X20X121K
R-140	750 ohms; vertical linearity control	25B999
*R-141	8700 ohms 3 watts, 5% wire wound	24A971
*R-142	7.5 ohms 5 watts, fuse type wire wound	25B1004
*R-143	190 ohms cold - 19 ohms hot, 5 watts; neg. temp. coeff.	25A1008
*R-144	80 ohms 10 watts, 5% wire wound	24A955
*R-145	42 ohms 3 watts, 5% wire wound.	24A957
R-146	100,000 ohms ½ watt, carbon	23X20X104K
R-147	100,000 ohms ½ watt, carbon	23X20X104K
R-148	22,000 ohms ½ watt, carbon.	23X20X223K
R-149	4.7 megohms ½ watt, carbon	23X20X475K
R-150	4.7 megohms ½ watt, carbon	23X20X475K
R-151	150,000 ohms 1 watt, carbon	23X30X154K
R-152	150,000 ohms 1 watt, carbon	23X30X154K
R-153	1200 ohms ½ watt, carbon	23X20X122K
R-154	5600 ohms ½ watt, carbon	23X20X562K
R-155	120,000 ohms; horizontal hold control; for mtg. on rear apron	25B1002
R-155	120,000 ohms; horizontal hold control; for mtg. on front apron	25B1014
R-156	120,000 ohms 1/2 watt, carbon	23X20X124K

* USE EXACT REPLACEMENT PART ONLY

SERVICE PARTS LIST (Cont.)

RESISTORS (Cont.)

Schematic Symbol	Description	Hallicrafters Part Number
R-157	4700 ohms ½ watt, carbon	23X20X472K
R-158	330,000 ohms ½ watt, carbon	23X20X334K
R-159	4700 ohms 1 watt, carbon	23X30X472K
R-160	50 ohms rheostat; horizontal centering (part of T-106)	---------
R-161	2.2 ohms ½ watt, carbon (part of T-106)	23X20X022K
R-162	150 ohms ½ watt, carbon	23X20X151K
R-163	2200 ohms ½ watt, carbon	23X20X222K
R-164	270 ohms ½ watt, carbon	23X20X271K
*R-165	10,000 ohms ½ watt, 5% carbon	23X20X103J
*R-166	10,000 ohms ½ watt, 5% carbon	23X20X103J
R-167	33,000 ohms ½ watt, carbon	23X20X333K
R-168/118	1,000,000/2500 ohms; dual volume/contrast control	25B997
R-169	1500 ohms ½ watt, carbon	23X20X152K
R-170	33,000 ohms ½ watt, carbon	23X20X333K
R-171	5 megohms; brightness control	25B1000
R-172	1.5 megohms; focus control	25A1003
R-173	220 ohms ½ watt, carbon	23X20X221K
R-174	1000 ohms ½ watt, carbon	23X20X102K
R-175	470,000 ohms ½ watt, carbon	23X20X474K
R-176	1200 ohms ½ watt, carbon	23X20X122K
R-177	33,000 ohms 1 watt, carbon	23X30X333K
R-178	82,000 ohms ½ watt, carbon	23X20X823K
R-179	220,000 ohms ½ watt, carbon	23X20X224K
R-180	8200 ohms ½ watt, carbon	23X20X822K
R-181	390,000 ohms ½ watt, carbon	23X20X394K
R-182	10,000 ohms 2 watts, carbon	23X40X103K
R-183	47,000 ohms ½ watt, carbon	23X20X473K
R-184	2200 ohms ½ watt, carbon	23X20X222K
R-185	1500 ohms ½ watt, carbon	23X20X152K
R-186	470,000 ohms ½ watt, carbon	23X20X474K
R-187	470,000 ohms ½ watt, carbon	23X20X474K
R-188	22,000 ohms 1 watt, carbon	23X30X223K
R-189	470,000 ohms ½ watt, carbon	23X20X474K
R-190	1.2 megohms ½ watt, carbon	23X20X125K
R-191	47,000 ohms ½ watt, carbon	23X20X473K
R-192	10,000 ohms 1 watt, carbon	23X30X103K
R-193	22,000 ohms 1 watt, carbon	23X30X223K
R-194	180,000 ohms ½ watt, carbon	23X20X184K

SERVICE PARTS LIST (Cont.)

MISCELLANEOUS PARTS FOR TV CHASSIS

Schematic Symbol	Description	Hallicrafters Part Number							
		A1200D CHASSIS	D1200D CHASSIS	F1200D CHASSIS	G1200D CHASSIS	K1200D CHASSIS	L1200D CHASSIS	W1200D CHASSIS	X1200D CHASSIS
	Bearing, tuner shaft	63B840	63B840	63B840	63B840	63B840	63B840	63B840	63B840
	Bearing, width control shaft	8A1810	8A1810	8A1810	8A1810	8A1810	8A1810	8A1810	8A1810
	Cap and lead; horiz. output plate	87A3590	87A3590	87A3590	87A3590	87A3590	87A3590	87A3590	87A3590
	Centering device; electrostatic tubes	21B138	21B138	21B138	21B138	21B138	21B138	21B138	21B138
	Clip, antenna lead	76A976	76A976	76A976	76A976	76A976	76A976	76A976	76A976
	Cord assembly with PL-103 & PL-104	87A1668	87A1668	87A1668	87A1668	87A1668	87A1668	87A1668	87A1668
	Coupling, width control shaft; plastic	29A195	29A195	29A195	29A195	29A195	29A195	29A195	29A195
	Grommet, rubber; tube socket shock mtg.	16A296	16A296	16A296	16A296	16A296	16A296	16A296	16A296
	Insulator block, chassis mtg.	78B860	78B860	78B860	78B860	78B860	78B860	78B860	78B860
	Insulator, interlock; mtg. for SO-103	8A1811	8A1811	8A1811	8A1811	8A1811	8A1811	8A1811	8A1811
	Insulator, 3 1/8" diameter; vol./cont. control	-------	-------	-------	-------	8B2020	8B2020	8B2020	8B2020
	Ion trap	21A145	21A146	21A145	21A146	21A145	21A146	21A145	21A146
	Knob, mahogany; AGC control switch	15A520	15A520	15A520	15A520	15A520	15A520	15A520	15A520
	Knob, mahogany; horiz. & vert. hold controls	15A530	15A530	15A530	15A530	15A530	15A530	15A530	15A530
	Plate, control mtg.; fiber	8A1790	8A1790	8A1790	8A1790	8A1790	8A1790	8A1790	8A1790
	Plate, elect. cap mtg.; 3 prong, 1-13/16" mtg. centers	8A1807	None	8A1807	None	8A1807	None	8A1807	None
	Plate, elect. cap. mtg.; 4 prong, 1-13/16" mtg. centers	8A749	8A749	8A749	8A749	8A749	8A749	8A749	8A749
	Plate, shock mounting; V-106	63A821	63A821	63A821	63A821	63A821	63A821	63A821	63A821
	Plate, front chassis cover	63C828	63C828	63C828	63C828	63C828	63C828	63C828	63C828
SO-102	Plug, speaker; with leads	See Model Data Sheets							
PL-103	Plug, interlock; part of line cord assembly	--------	--------	-------	-------	-------	-------	-------	-------
PL-104	Plug, wall outlet; part of line cord assembly	-------	-------	-------	-------	-------	-------	-------	-------
	Plug, two prong; R-142 mtg.	88A851	88A851	88A851	88A851	88A851	88A851	88A851	88A851
	Socket, two prong; R-142 mtg	10A499	10A499	10A499	10A499	10A499	10A499	10A499	10A499
	Shield, miniature tube; V-102 & V-103	69A232	69A232	69A232	69A232	69A232	69A232	69A232	69A232
	Shaft, width control adj.; 1/4" diameter	74A558	74A558	74A558	74A558	74A558	74A558	74A558	74A558
	Shaft retaining ring; 1/4"	76A775	76A775	76A775	76A775	76A775	76A775	76A775	76A775
	Shaft, horiz. centering control; 3/8" with key	74B559	74B559	74B559	74B559	74B559	74B559	74B559	74B559
	Shaft retaining ring; 3/8"	76A968	76A968	76A968	76A968	76A968	76A968	76A968	76A968
	Socket, interlock; chassis mtg., male	10A498	10A498	10A498	10A498	10A498	10A498	10A498	10A498
	Socket, 7 pin wafer; 1-5/16" mtg. centers	6B314	6B314	6B314	6B314	6B314	6B314	6B314	6B314
	Socket, 7 pin wafer; 1" mtg. centers	6A340	6A340	6A340	6A340	6A340	6A340	6A340	6A340
	Socket, 7 pin wafer with dummy lug; 1" mtg. centers	6B434	6B434	6B434	6B434	6B434	6B434	6B434	6B434
	Socket, octal molded; shock mount for V-108	6A432	6A432	6A432	6A432	6A432	6A432	6A432	6A432
	Socket, octal molded; 1-5/16" mtg. centers	6A436	6A436	6A436	6A436	6A436	6A436	6A436	6A436
	Socket, octal molded; 1-1/2" mtg., pins 1 & 4 deleted	6A440	6A440	6A440	6A440	6A440	6A440	6A440	6A440
	Socket, 9 pin molded mica filled; 1-1/8" mtg. centers	6A433	6A433	6A433	6A433	6A433	6A433	6A433	6A433
	Spring, control shaft; horiz. centering control	75A259	75A259	75A259	75A259	75A259	75A259	75A259	75A259
S-101	Switch, off-on; part of volume/contrast control	-------	-------	-------	-------	-------	-------	-------	-------
S-102	Switch, AGC control	60B500	60B500	-------	-------	60B500	60B500	-------	-------
S-103	Switch, AGC control	-------	-------	60B507	60B507	-------	-------	60B507	60B507
TS-101	Terminal strip, antenna	88B456	88B456	88B456	88B456	88B456	88B456	88B456	88B456
SO-101	Test socket; 3 pin	10B347	10B347	10B347	10B347	10B347	10B347	10B347	10B347
	Test socket plug; 3 pin	10B346	10B346	10B346	10B346	10B346	10B346	10B346	10B346
	Washer, extruded fiber; 3/8" ID	4A602	4A602	4A602	4A602	4A602	4A602	4A602	4A602

SERVICE PARTS LIST

MISCELLANEOUS PARTS FOR TV CHASSIS

Schematic Symbol	Description	Hallicrafters Part Number J1200D CHASSIS 20"	P1200D CHASSIS 17"	R1200D CHASSIS 20"	T1200D CHASSIS 20"
	Bearing, tuner shaft	8B1942	8B1964	8B1964	8B1964
	Bearing, width control shaft	8A1810	8A1810	8A1810	8A1810
	Cap and lead; horiz. output plate	87A3590	87A3590	87A3590	87A3590
	Centering device; electrostatic tubes	21B138	21B138	21B138	21B138
	Clip, antenna lead	76A976	76A976	76A976	76A976
	Cord assembly with PL-103 & PL-104	87A1668-1	87A1668-1	87A1668-1	87A1668-1
	Coupling width control shaft; plastic	29A195	29A195	29A195	29A195
	Grommet, rubber; tube socket shock mtg.	16A296	16A296	16A296	16A296
	Insulator block, chassis mtg.	78B860	78B860	78B860	78B860
	Insulator, interlock; mtg. for SO-103	8A1811	8A1811	8A1811	8A1811
	Insulator, 3-1/8" diam.; for vol./cont. control	8B2020	8B2020	8B2020	8B2020
	Ion trap	21A146	21A145	21A146	21A146
	Knob, mahogany; AGC control switch	12A562	15A562	15A562	15A562
	Knob, horiz. & vert. hold controls	15C552	15A530	15A530	15C552
	Plate, control mtg.; fiber	8A1790	8A1790	8A1790	8A1790
	Plate, elect. cap mtg.; 3 prong, 1-13/16" mtg. centers	None	8A1807	None	None
	Plate, elect. cap. mtg.; 4 prong, 1-13/16" mtg. centers	8A749	8A749	8A749	8A749
	Plate, front chassis cover	63D905	63B860	63B860	63D905
	Plate, mounting; for 51B1642 hor. stab. coil	63A902	63A902	63A902	63A902
	Plate, shock mounting; V-106	63A821	63A821	63A821	63A821
SO-102	Plug, speaker; with leads	See ——— Model ——— Data ——— Sheets			
PL-103	Plug, interlock; part of line cord assembly	-------	-------	-------	-------
PL-104	Plug, wall outlet; part of line cord assembly	-------	-------	-------	-------
	Plug, two prong; R-142 mtg.	88A851	88A851	88A851	88A851
	Socket, two prong; R-142 mtg.	10A499	10A499	10A499	10A499
	Shield, miniature tube; V-102 & V-103	69A232	69A232	69A232	69A232
	Shaft, width control adj.; 1/4" diameter	74A558	74A558	74A558	74A558
	Shaft retaining ring; 1/4"	76A775	76A775	76A775	76A775
	Shaft, horiz. centering control; 3/8" with key	74B559	74B559	74B559	74B559
	Shaft retaining ring; 3/8"	76A968	76A968	76A968	76A968
SO-103	Socket, interlock; chassis mtg., male	10A498	10A498	10A498	10A498
	Socket, 7 pin wafer; 1-5/16" mtg. centers	6B314	6B314	6B314	6B314
	Socket, 7 pin wafer; 1" mtg. centers	6A340	6A340	6A340	6A340
	Socket, 7 pin wafer with dummy lug; 1" mtg. centers	6B434	6B434	6B434	6B434
	Socket, octal molded; shock mount for V-108	6A432	6A432	6A432	6A432
	Socket, octal molded; 1-5/16" mtg. centers	6A436	6A436	6A436	6A436
	Socket, octal molded; 1-1/2" mtg., pins 1 & 4 deleted	6A440	6A440	6A440	6A440
	Socket, 9 pin molded mica filled; 1-1/8" mtg. centers	6A433	6A433	6A433	6A433
	Spring, control shaft; horiz. centering control	75A259	75A259	75A259	75A259
S-101	Switch, off-on; part of volume/contrast control	-------	-------	-------	-------
S-103	Switch, AGC control	60B507	60B507	60B507	60B507
TS-101	Terminal strip, antenna	88B456	88B456	88B456	88B456
	Washer, extruded fiber; 3/8" ID	4A602	4A602	4A602	4A602

PICTURE TUBE AND MOUNTING COMPONENTS FOR A, D, F, G, K, L, P, R, T, W, AND X1200D CHASSIS

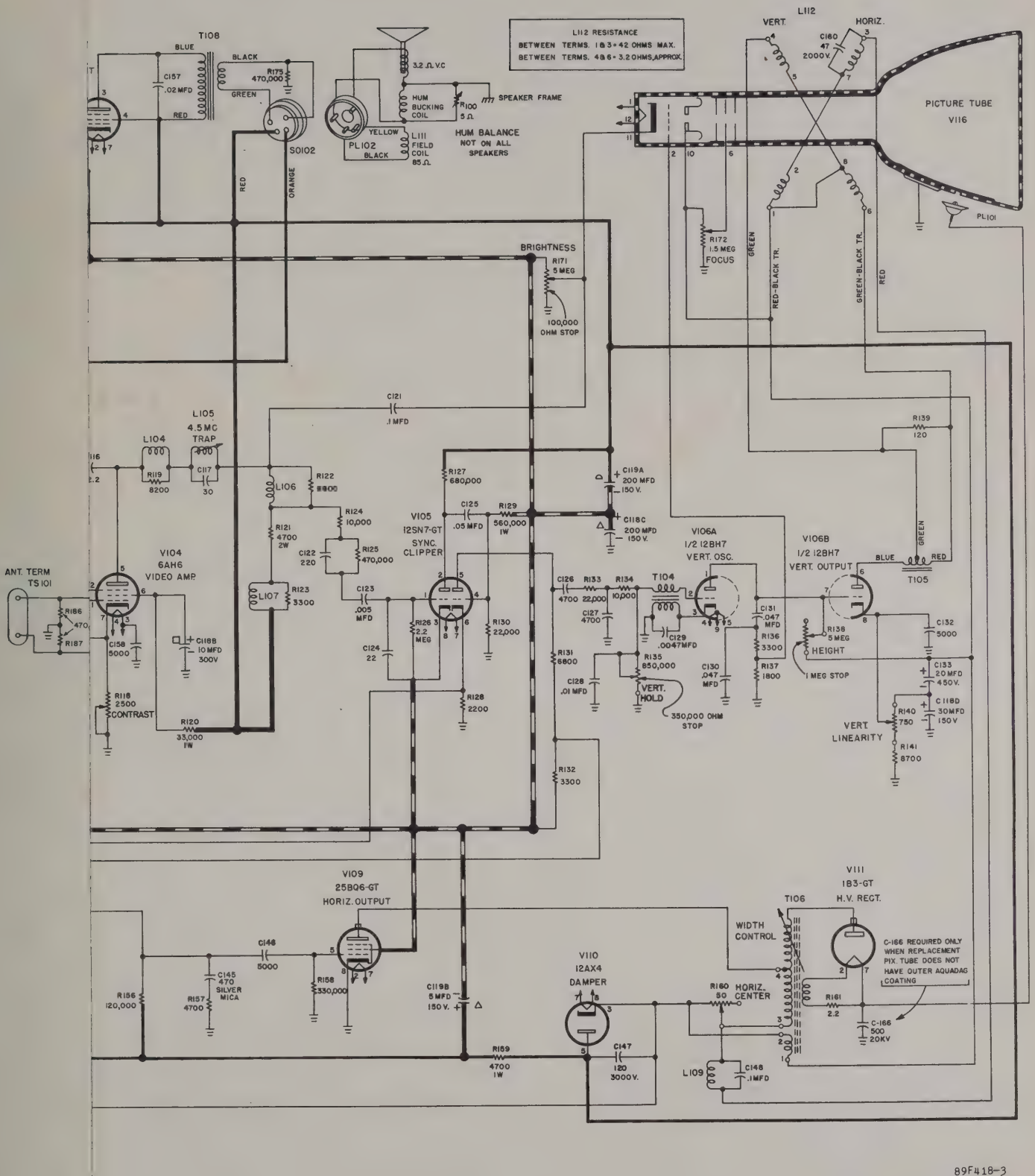
Schematic Symbol	Description	Hallicrafters Part Number				
		v	c	e	s	ae
		For Glass 17" Rect. plastic cab.	For Glass 17" Rect. wood cab.	For Glass 20" Rect. wood cab.	For Metal 21" Rect. wood cab.	For Glass 21" Rect. wood cab.
V-116	Picture tube	90X17HP4	90X17HP4	90X20HP4	90X21MP4	90X21FP4A
	Bracket, deflection yoke mtg.	67C1244	67C1244	67C1244	67C1244	67C1244
	Bracket, front pix tube support	8B1962	8B1808	67C1993	-------	67C2025
	Bracket, front right pix tube support	-------	-------	-------	67C2030	-------
	Bracket, front left pix tube support	-------	-------	-------	67C2031	-------
	Bracket, rear pix tube and yoke support	*67B2040	*67D1948	67A1979	67A2035	67D2024
	Bracket, bottom extension for above	None	None	None	None	67A2156
	Bracket, stop pad; center mtg.	*67B2082	*67A1968	None	None	None
	Bracket, stop pad; right mtg.	None	None	67C1992	None	67C2175
	Bracket, stop pad; left mtg.	None	None	67C1991	None	67C2174
	Centering device; electrostatic tubes	21B138	21B138	21B138	21B138	21B138
	Collar, picture tube mtg.; rubber	16A295	16A295	16A295	16A295	16A295
	Cushion, pix tube mtg.; sponge rubber	16A316	16A316	16A316	None	16C162
	Deflection yoke	See Page 1952-95				
	Ground and shield, pix tube; metalized paper	69C493	69C493	69C506	None	69C506
	Hook, pix tube ground and shield	76A967	76A967	76A967	None	76A967
	Ion trap	21A145	21A145	21A146	21A146	21A146
	Keeper, pix tube anode	8A1375	8A1375	8A1375	None	8A1375
	Pad, pix tube mtg.; 3" rubber channel	16A294	16A294	16A294	16A237	16A294
	Pad, stop; rubber channel	16A314	16A297	16A309	None	16A309
PL-101	Plug, pix tube anode	10A500	10A500	10A500	None	10A500
	Polyethylene mtg. ring; metal pix tube	None	None	None	7E313	None
	Screw, deflection yoke adj.	3A1610	3A1610	3A1610	3A1610	3A1610
	Sleeve, insulating; rear pix tube support springs	None	None	None	8A1926	None
	Sleeve, 12" insulating; anode lead	None	None	None	6A542	None
	Socket assembly, pix tube	6C465	*6C465	6A465	6A465	6A465
	Spacer, deflection yoke adj. screw	73A580	73A580	73A580	73A580	73A580
	Spacer, front pix tube support	63A851	63A851	8A1943	None	None
	Spring, anode keeper; $1\frac{1}{2}$" long	75A202	75A202	75A202	None	75A202
	Spring, anode keeper, $3\frac{1}{4}$" long	75A203	75A203	75A203	None	75A203
	Spring, pix tube ground and shield	75A257	75A257	75A257	None	75A257
	Spring, pix tube ground	None	None	75B246	None	75B246
	Spring, pix tube rear support	75A268	75B258	75A262	75A269	75A267
	Strap, pix tube mtg.; with end brackets	76B1025	76A1042	76B1026	76A848	76B1027
	Strap, copper; anode connector	None	None	None	76A371	None
	Strip, rubber	None	None	None	16A291	None

*On some 17" chassis the picture tube is mounted with a forward tilt of approximately four degrees. This tilt causes the bottom of the rear picture tube and yoke support bracket to raise up and at the same time move toward the rear of the chassis. The odd shape of the bracket used to mount the rear support bracket in this position is easily recognized. An additional spacer is also placed under the front picture tube mounting brackets on some chassis as indicated below.

The following parts are used when the picture tube is tilted:

	CHASSIS A,F,K & W1200D	CHASSIS P1200D ONLY
Socket assembly, pix tube	6A454	None
Spacer, extra; front pix tube support	8A1985	None
Bracket, right rear support	67C2081	67C2081
Bracket, left rear support	67C2080	67C2080
Bracket, rear pix tube & yoke support	No change	67A2083
Bracket, stop pad; center mounting	No change	None

When a chassis with a tilted picture tube is installed in a cabinet a different mask, cabinet back and sometimes safety glass are used. These different cabinet parts are listed on the model data sheets for each individual model when applicable.



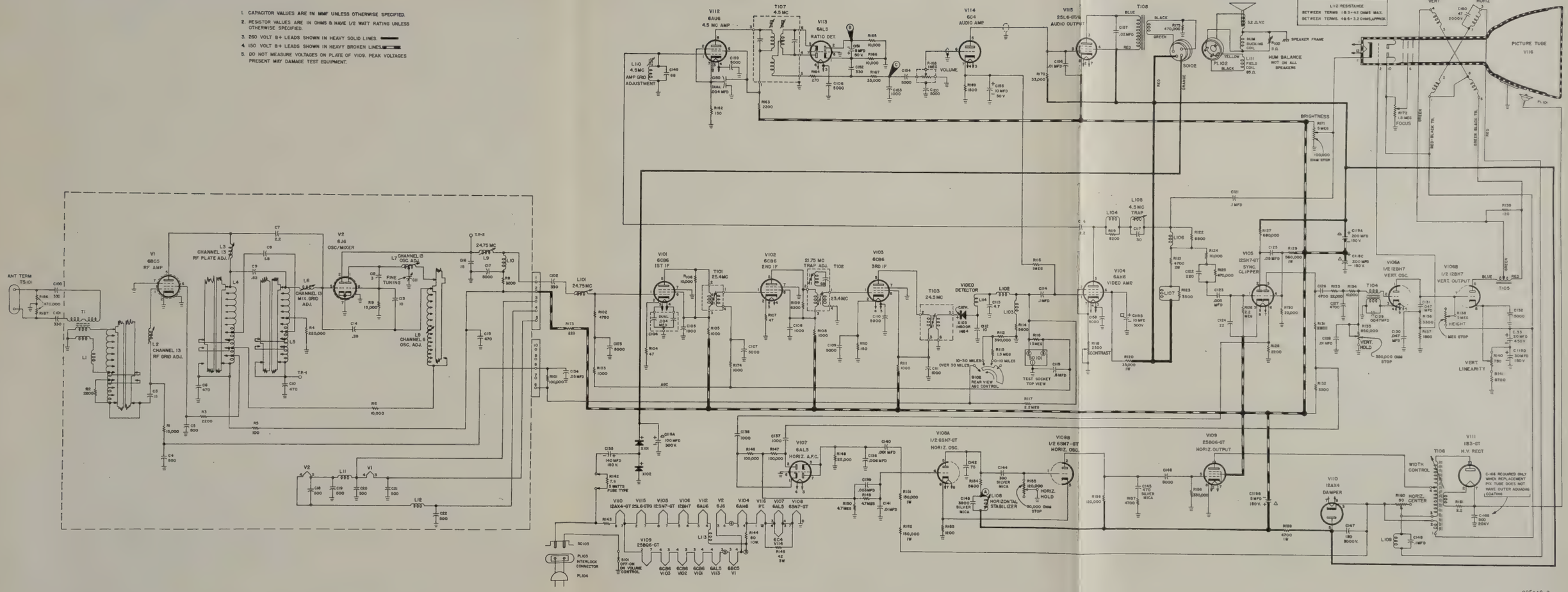
89F418-3

17" CHASSIS

A1200D

RUN 1

1. CAPACITOR VALUES ARE IN MMF UNLESS OTHERWISE SPECIFIED.
2. RESISTOR VALUES ARE IN OHMS & HAVE 1/2 WATT RATING UNLESS OTHERWISE SPECIFIED.
3. 260 VOLT B+ LEADS SHOWN IN HEAVY SOLID LINES.
4. 150 VOLT B+ LEADS SHOWN IN HEAVY BROKEN LINES.
5. DO NOT MEASURE VOLTAGES ON PLATE OF V109. PEAK VOLTAGES PRESENT MAY DAMAGE TEST EQUIPMENT.

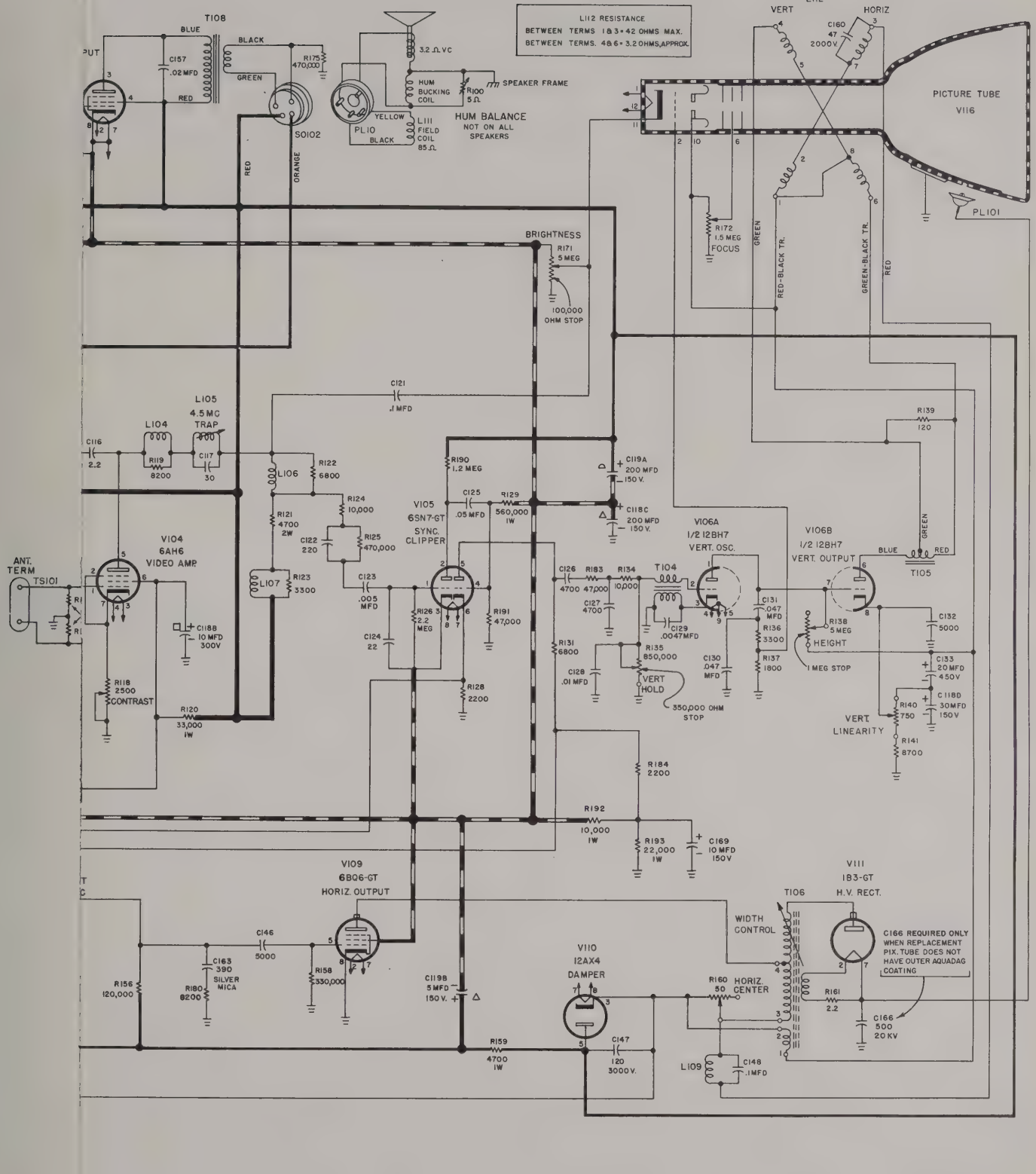


89F418-3

VALUES AND TOLERANCES SHOWN ARE NOMINAL AND VARIATIONS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.

9wX955-3
1052

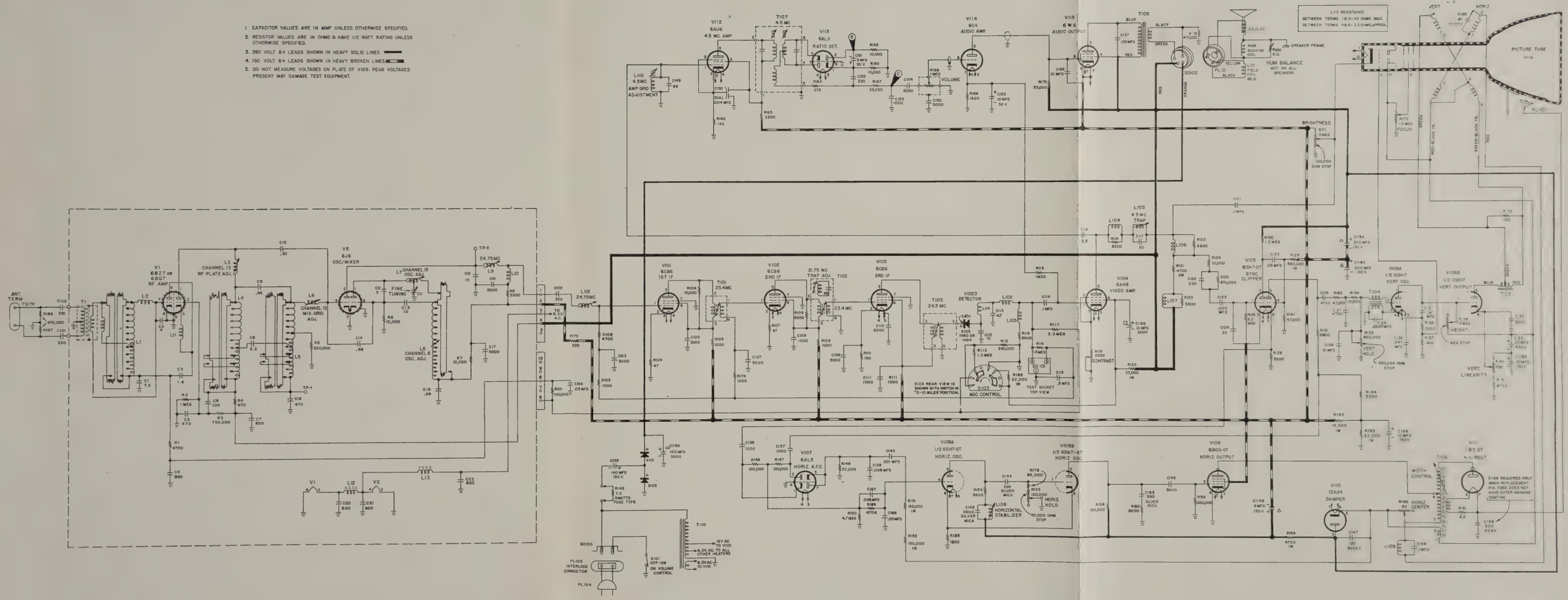
17" CHASSIS
A1200D
RUN 1



89F436-1

17" CHASSIS
F1200D
RUN 1

1. CAPACITOR VALUES ARE IN MMF UNLESS OTHERWISE SPECIFIED.
2. RESISTOR VALUES ARE IN OHMS & HAVE 1/2 WATT RATING UNLESS OTHERWISE SPECIFIED.
3. 260 VOLT B+ LEADS SHOWN IN HEAVY SOLID LINES.
4. 150 VOLT B+ LEADS SHOWN IN HEAVY BROKEN LINES.
5. DO NOT MEASURE VOLTAGES ON PLATE OF V109. PEAK VOLTAGES PRESENT MAY DAMAGE TEST EQUIPMENT.

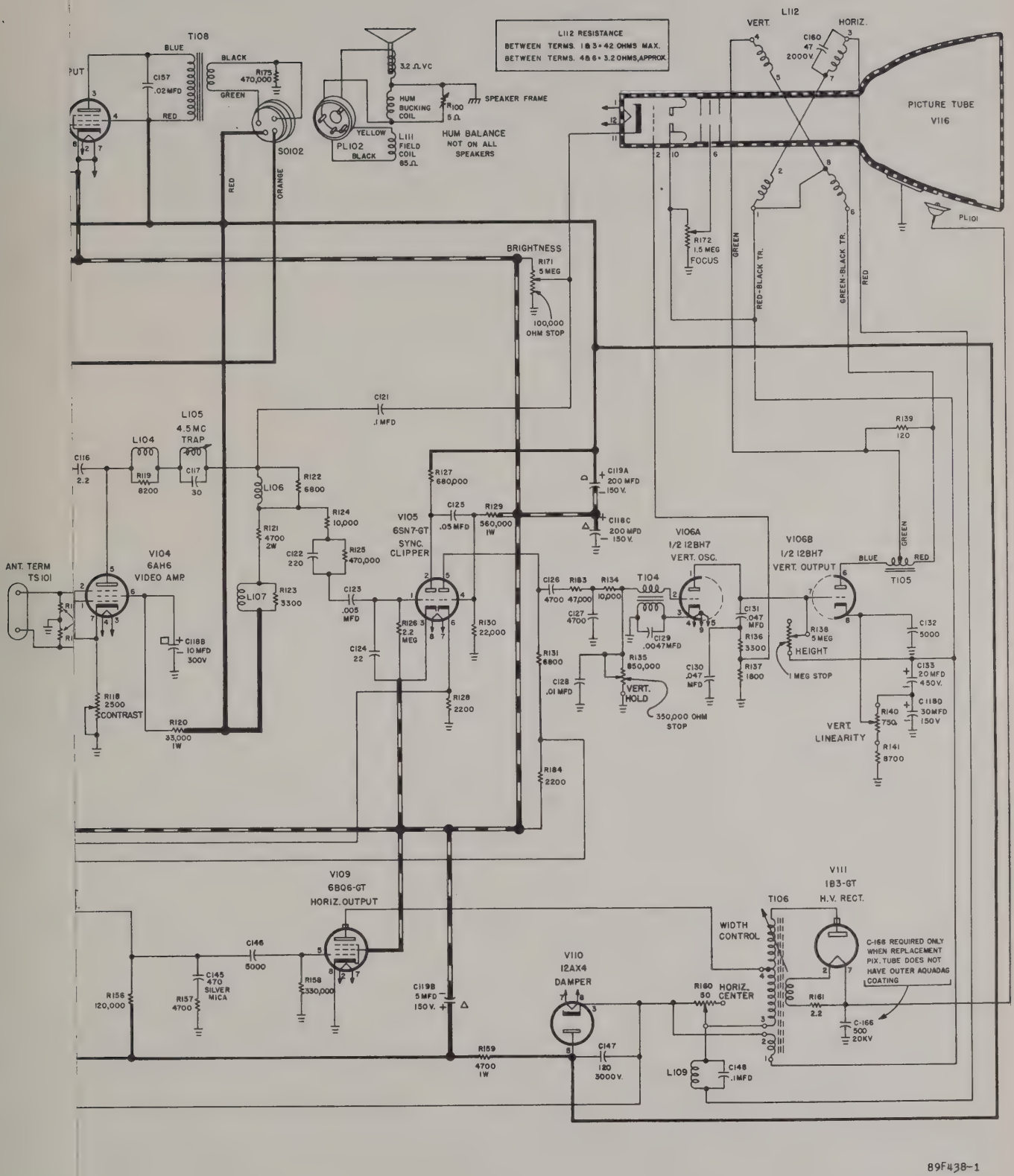


89F836-1

VALUES AND TOLERANCES SHOWN ARE NOMINAL AND VARIATIONS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.

94X955-3
1052

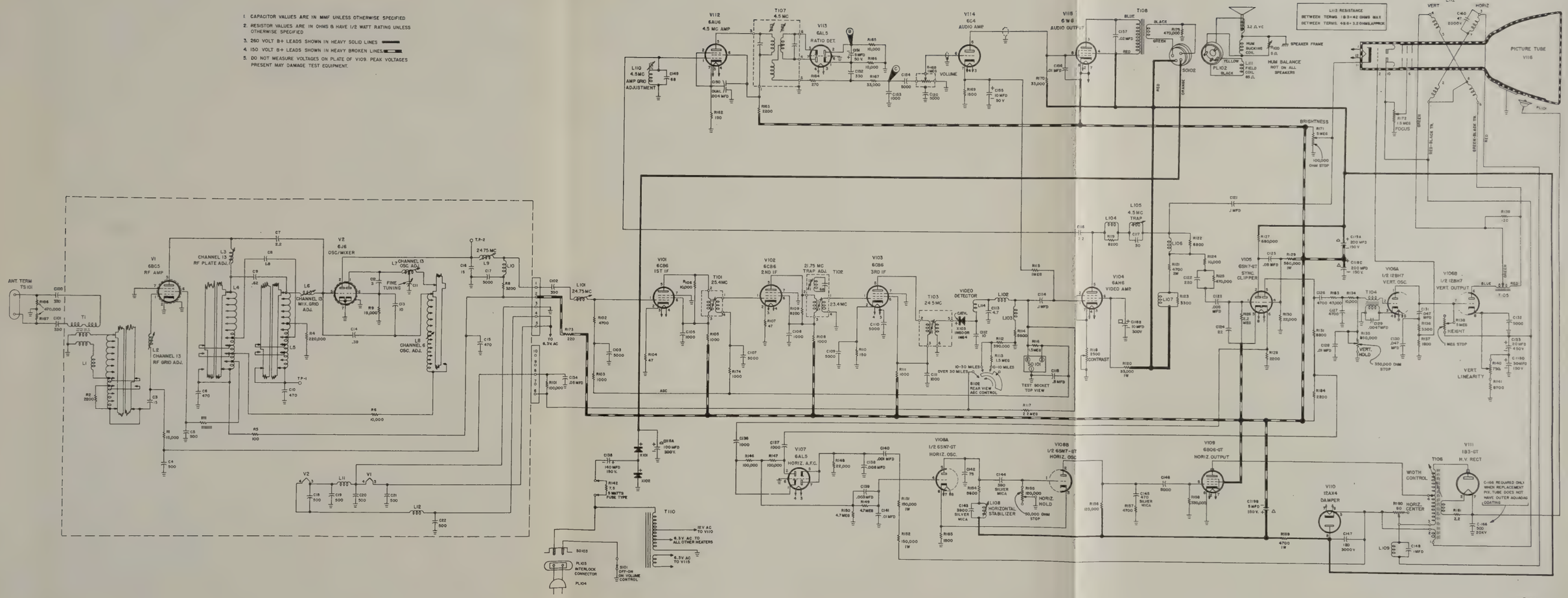
17" CHASSIS
F1200D
RUN 1



89F438-1

17" CHASSIS
K1200D
RUN 1

1. CAPACITOR VALUES ARE IN MMF UNLESS OTHERWISE SPECIFIED
2. RESISTOR VALUES ARE IN OHMS & HAVE 1/2 WATT RATING UNLESS OTHERWISE SPECIFIED
3. 260 VOLT B+ LEADS SHOWN IN HEAVY SOLID LINES
4. 150 VOLT B+ LEADS SHOWN IN HEAVY BROKEN LINES
5. DO NOT MEASURE VOLTAGES ON PLATE OF V109. PEAK VOLTAGES PRESENT MAY DAMAGE TEST EQUIPMENT.



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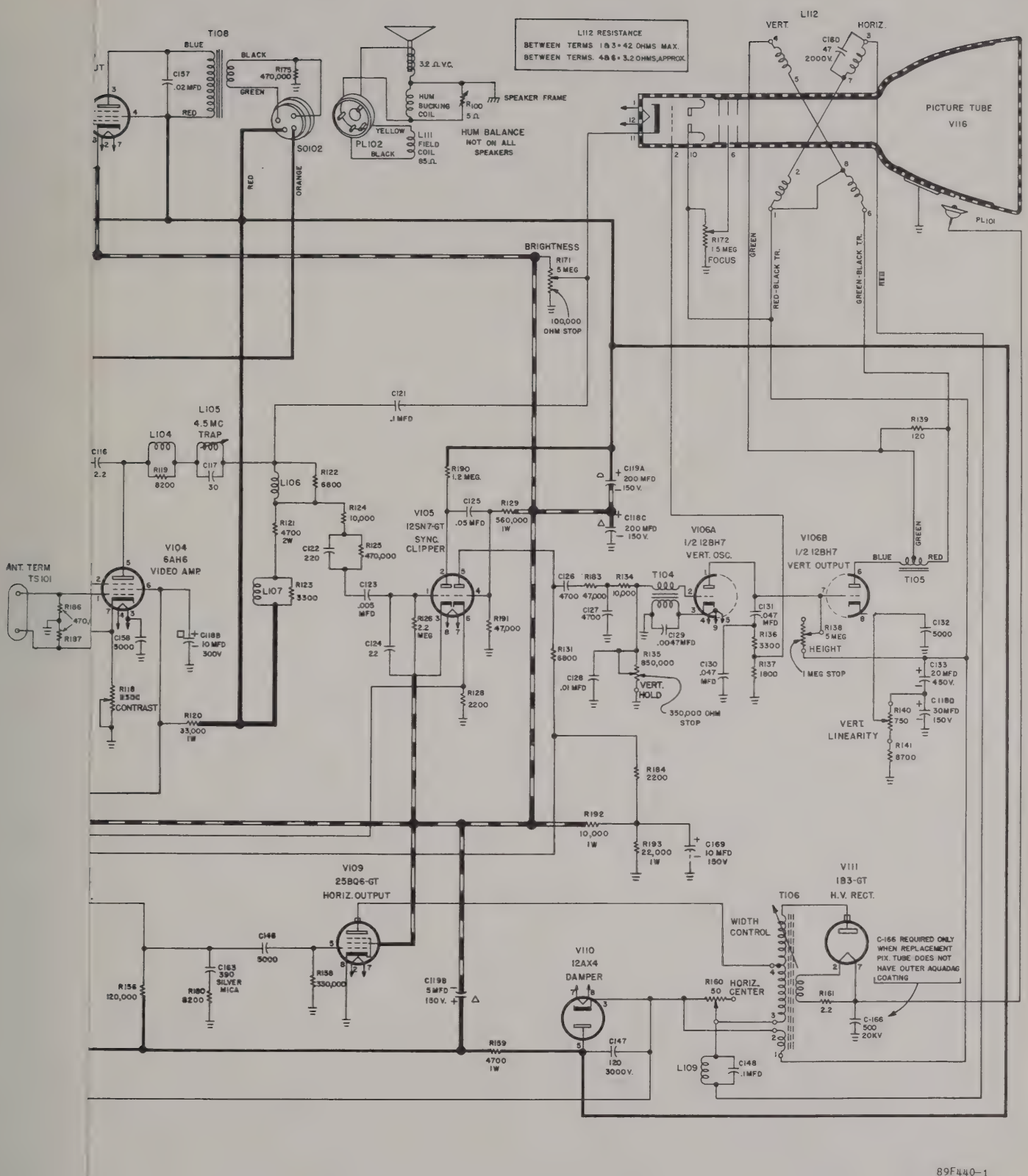
9aX955-3
1052

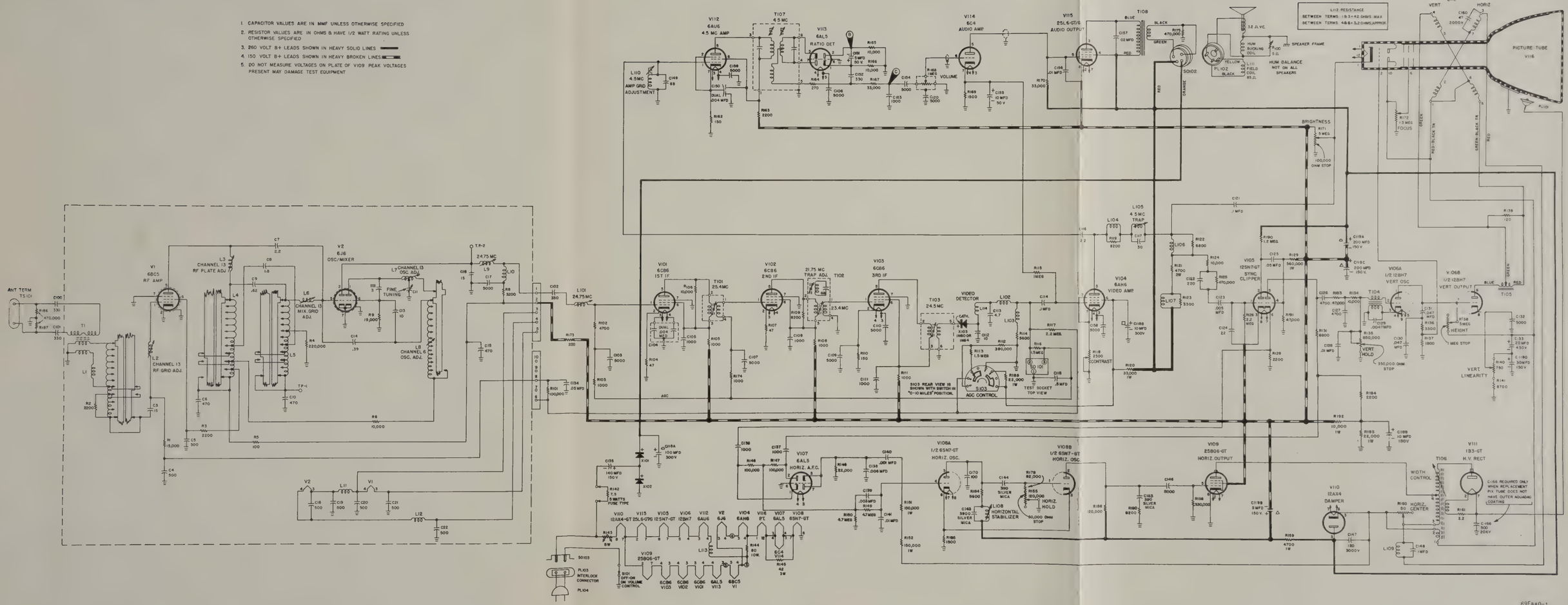
17" CHASSIS
K1200D
RUN 1



89F440-1

17" CHASSIS
W1200D
RUN 1

1. CAPACITOR VALUES ARE IN MMF UNLESS OTHERWISE SPECIFIED
2. RESISTOR VALUES ARE IN OHMS & HAVE 1/2 WATT RATING UNLESS OTHERWISE SPECIFIED
3. 260 VOLT B+ LEADS SHOWN IN HEAVY SOLID LINES
4. 150 VOLT B+ LEADS SHOWN IN HEAVY BROKEN LINES
5. DO NOT MEASURE VOLTAGES ON PLATE OF V109 PEAK VOLTAGES PRESENT MAY DAMAGE TEST EQUIPMENT



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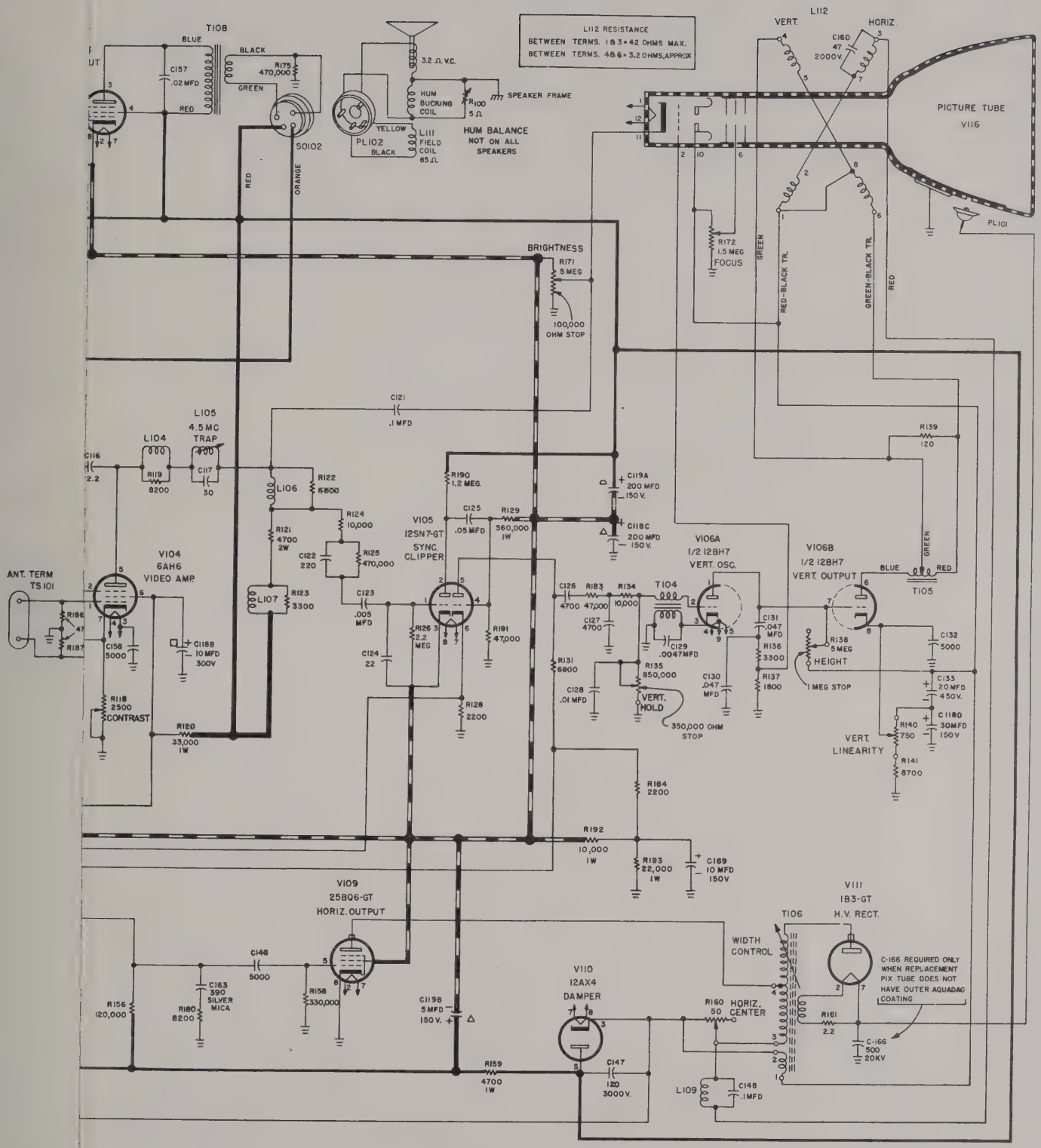
94X955-3
1052

17" CHASSIS
W1200D
RUN 1

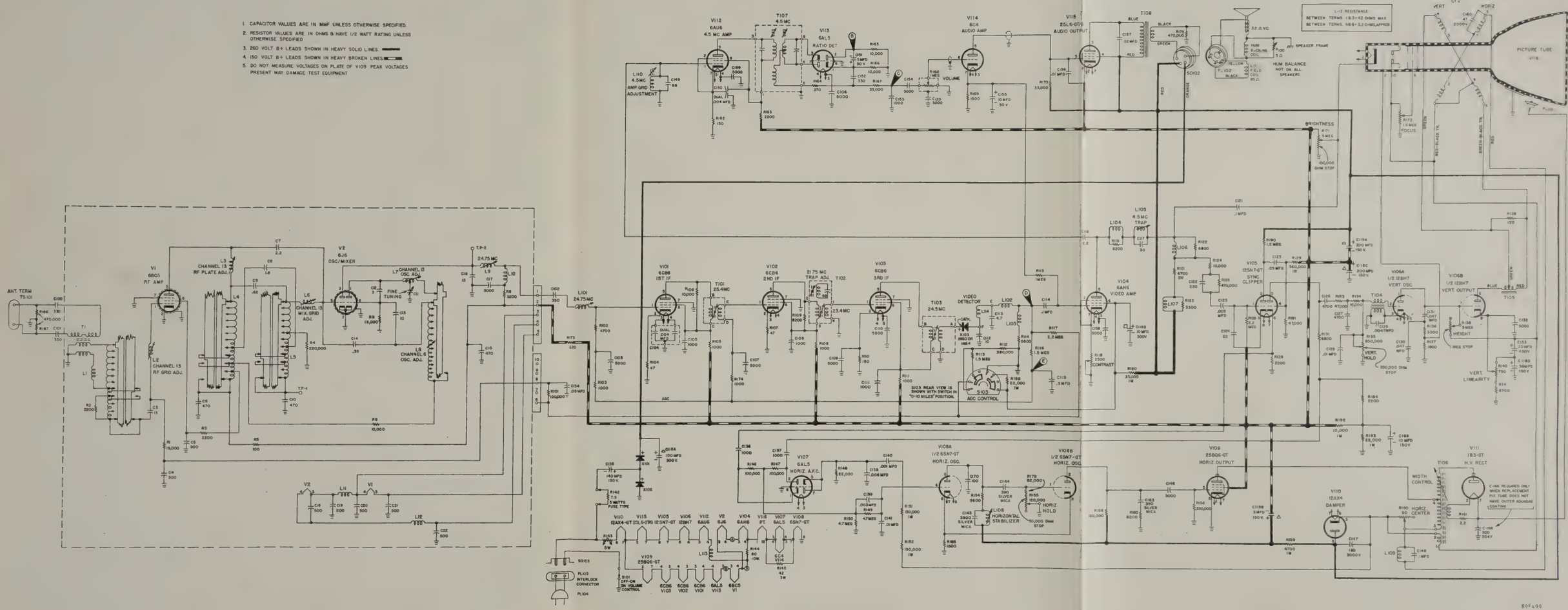


89F499

17" CHASSIS
P1200D
RUN 1

1. CAPACITOR VALUES ARE IN MMF UNLESS OTHERWISE SPECIFIED.
2. RESISTOR VALUES ARE IN OHMS & HAVE 1/2 WATT RATING UNLESS OTHERWISE SPECIFIED
3. 250 VOLT B+ LEADS SHOWN IN HEAVY SOLID LINES.
4. 150 VOLT B+ LEADS SHOWN IN HEAVY BROKEN LINES.
5. DO NOT MEASURE VOLTAGES ON PLATE OF V109 PEAK VOLTAGES PRESENT MAY DAMAGE TEST EQUIPMENT

L12 RESISTANCE
BETWEEN TERMS 1&3=42 OHMS MAX
BETWEEN TERMS. 4&6=3.2 OHMS APPROX



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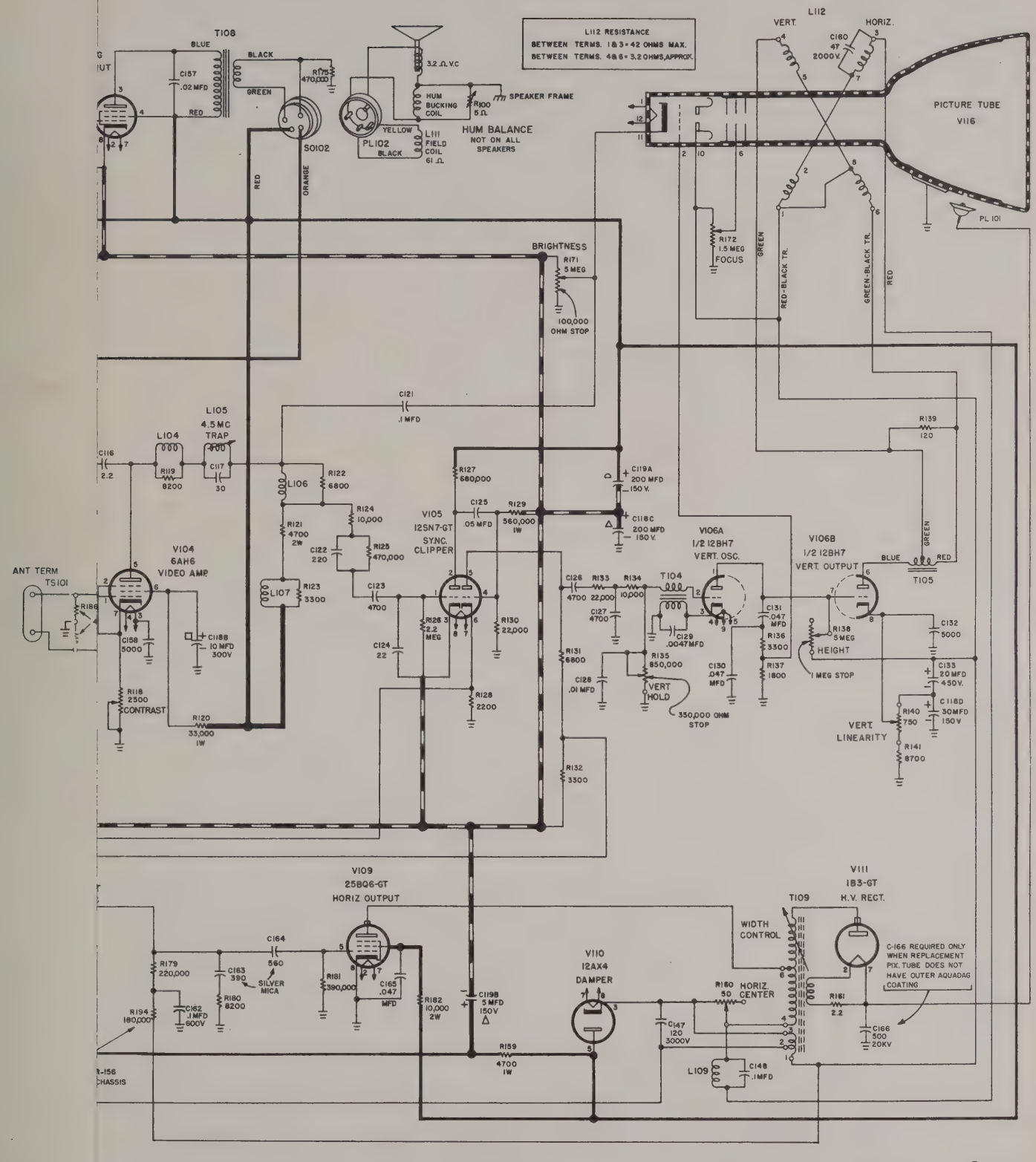
9RX955-3
1052

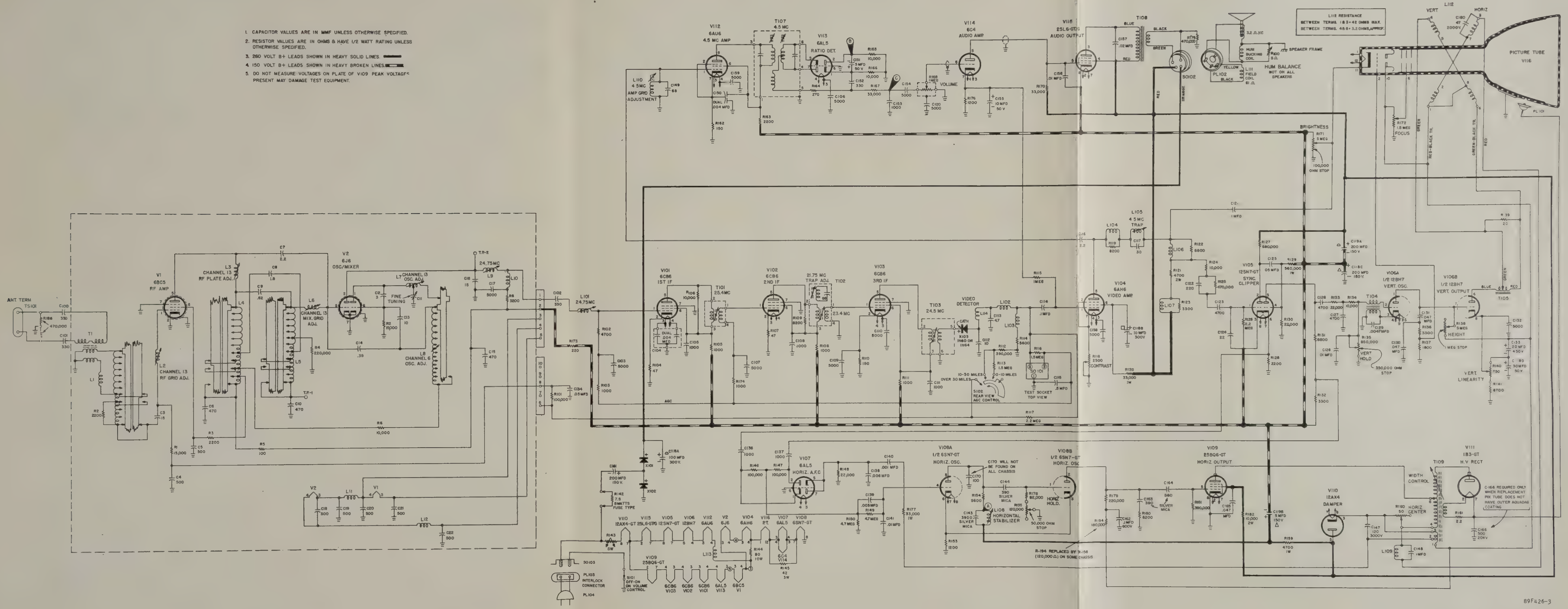
17" CHASSIS
P1200D
RUN 1



89F426-3

20" CHASSIS
D1200D
RUN 1

1. CAPACITOR VALUES ARE IN MMF UNLESS OTHERWISE SPECIFIED.
2. RESISTOR VALUES ARE IN OHMS & HAVE 1/2 WATT RATING UNLESS OTHERWISE SPECIFIED.
3. 260 VOLT B+ LEADS SHOWN IN HEAVY SOLID LINES.
4. 150 VOLT B+ LEADS SHOWN IN HEAVY BROKEN LINES.
5. DO NOT MEASURE VOLTAGES ON PLATE OF V109 PEAK VOLTAGES PRESENT MAY DAMAGE TEST EQUIPMENT.



89F426-3

20" CHASSIS
D1200D
RUN 1

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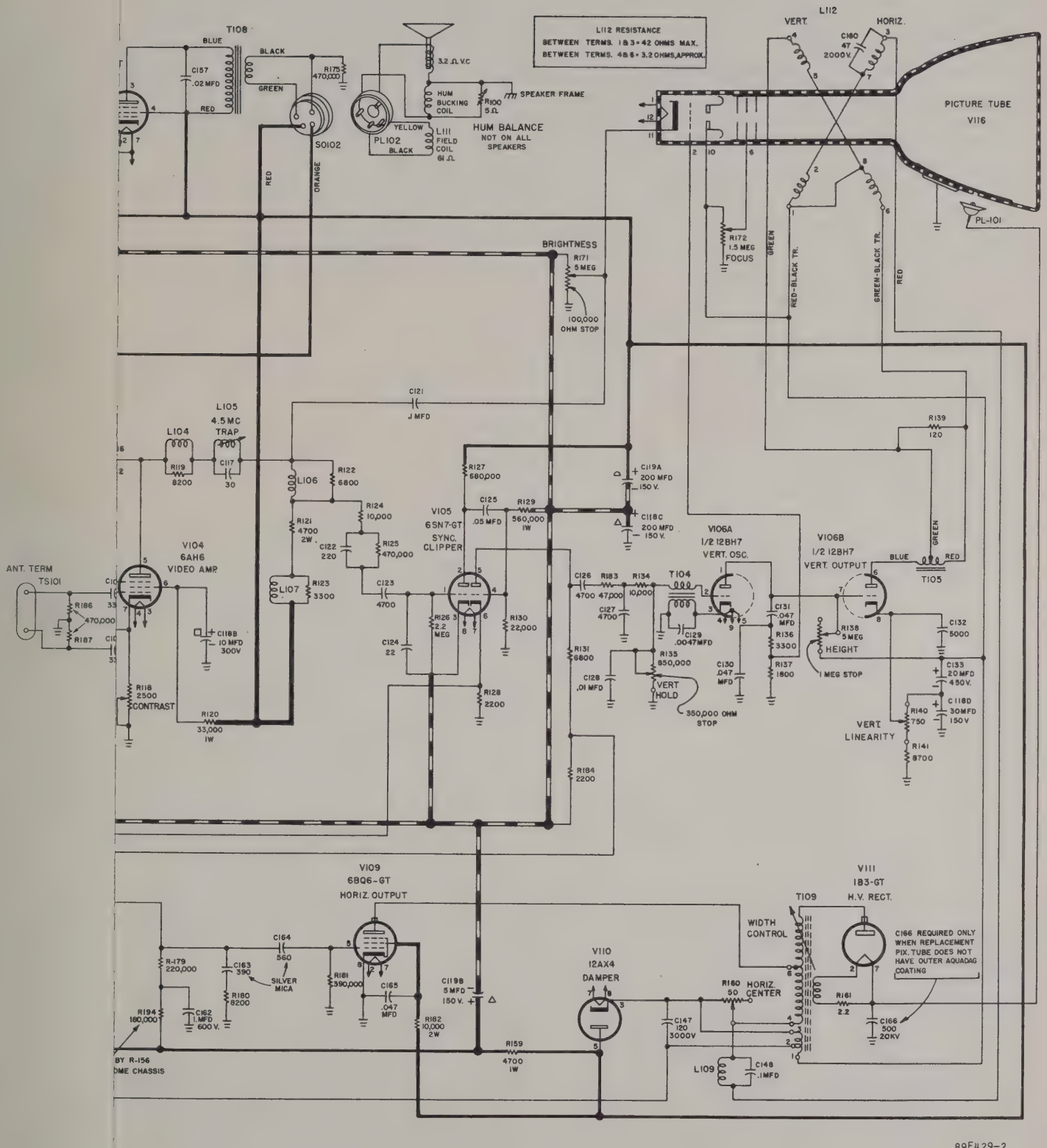
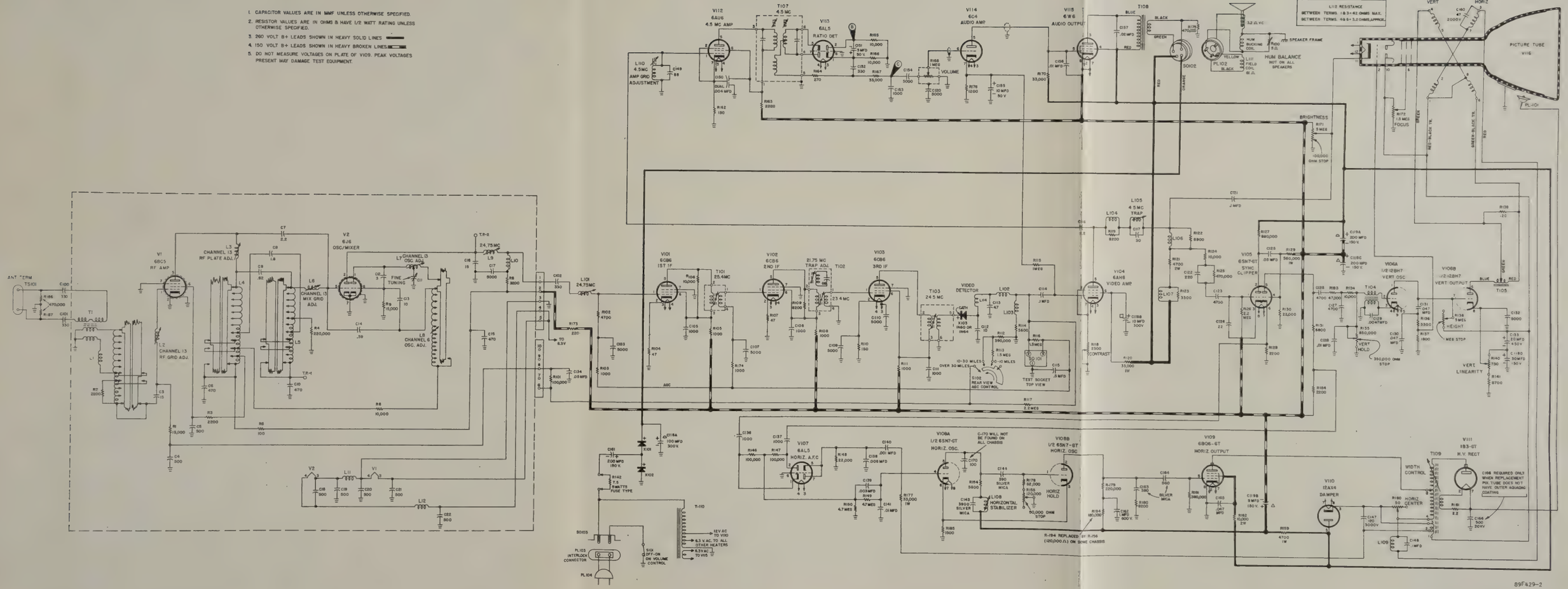
94X955-3
1052



89F429-2

20" CHASSIS
L1200D
RUN 1

1. CAPACITOR VALUES ARE IN MMF UNLESS OTHERWISE SPECIFIED.
2. RESISTOR VALUES ARE IN OHMS & HAVE 1/2 WATT RATING UNLESS OTHERWISE SPECIFIED.
3. 260 VOLT B+ LEADS SHOWN IN HEAVY SOLID LINES ━━━
4. 150 VOLT B+ LEADS SHOWN IN HEAVY BROKEN LINES ━ ━ ━
5. DO NOT MEASURE VOLTAGES ON PLATE OF V109. PEAK VOLTAGES PRESENT MAY DAMAGE TEST EQUIPMENT.



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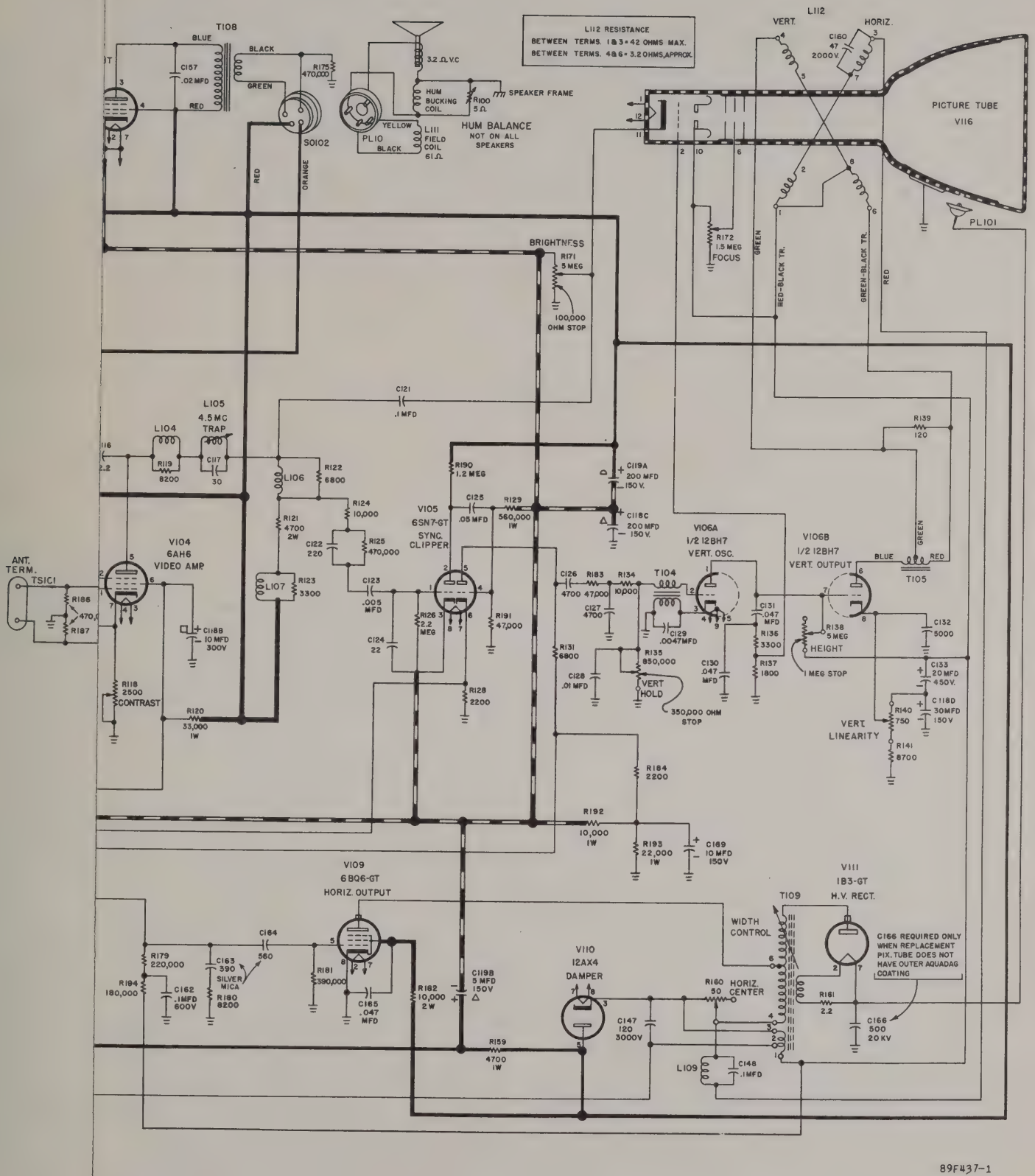
94X955-3
1052

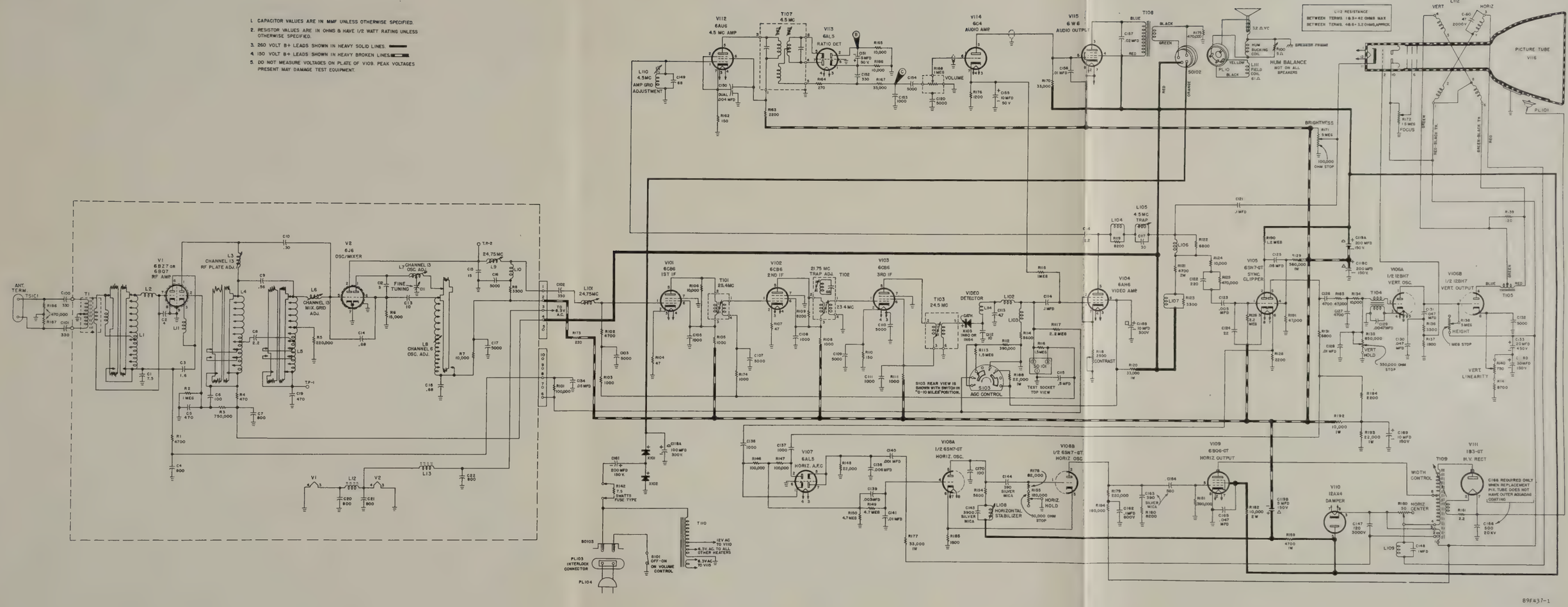
20" CHASSIS
L1200D
RUN 1



89F437-1

20" CHASSIS
G1200D
RUN 1

1. CAPACITOR VALUES ARE IN MMF UNLESS OTHERWISE SPECIFIED.
2. RESISTOR VALUES ARE IN OHMS & HAVE 1/2 WATT RATING UNLESS OTHERWISE SPECIFIED.
3. 260 VOLT B+ LEADS SHOWN IN HEAVY SOLID LINES.
4. 150 VOLT B+ LEADS SHOWN IN HEAVY BROKEN LINES.
5. DO NOT MEASURE VOLTAGES ON PLATE OF V109. PEAK VOLTAGES PRESENT MAY DAMAGE TEST EQUIPMENT.



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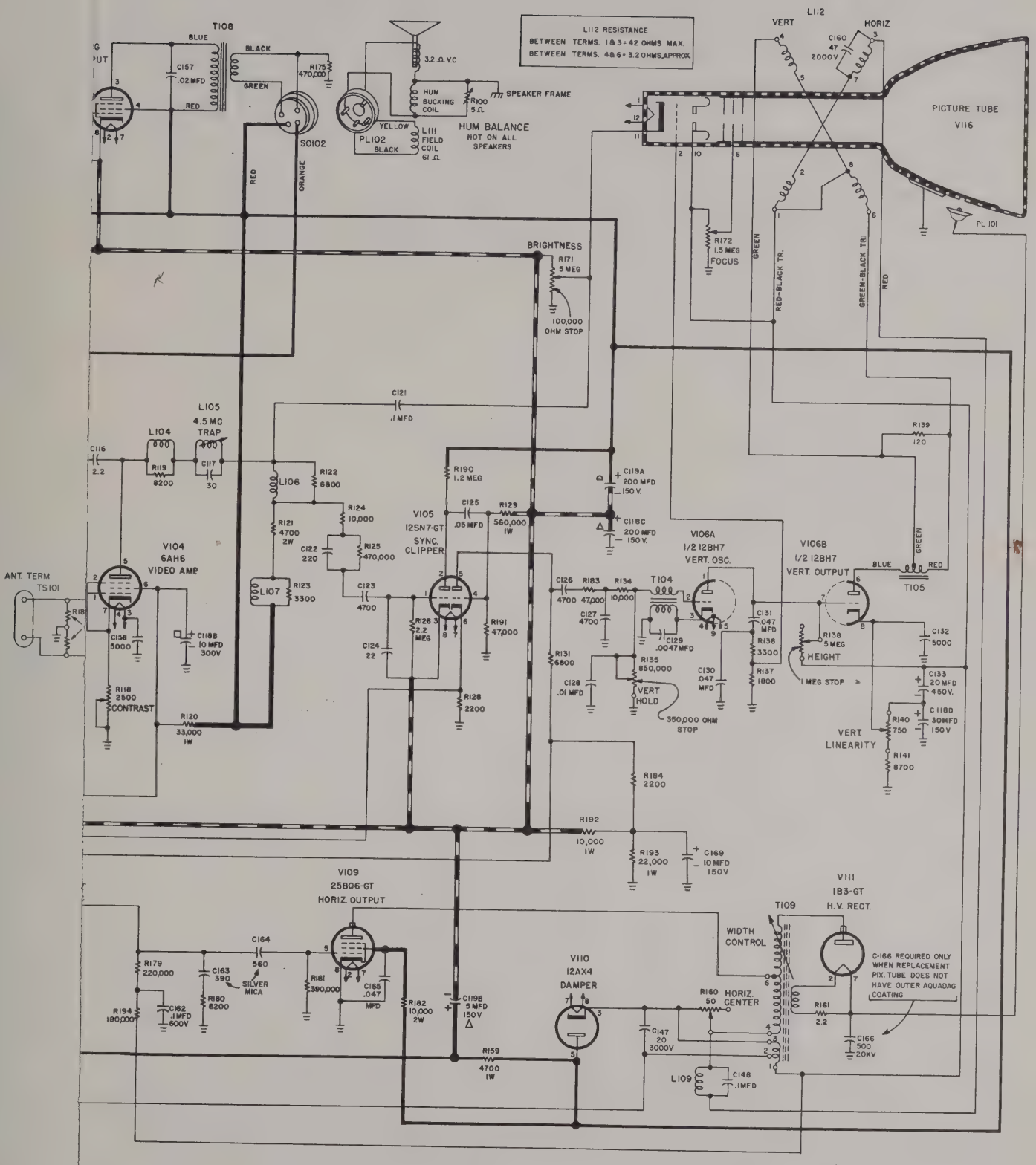
94X955-3
1052

20" CHASSIS
G1200D
RUN 1



89F441-1

20" CHASSIS
X1200D
RUN 1

1. CAPACITOR VALUES ARE IN MMF UNLESS OTHERWISE SPECIFIED.
2. RESISTOR VALUES ARE IN OHMS & HAVE 1/2 WATT RATING UNLESS OTHERWISE SPECIFIED
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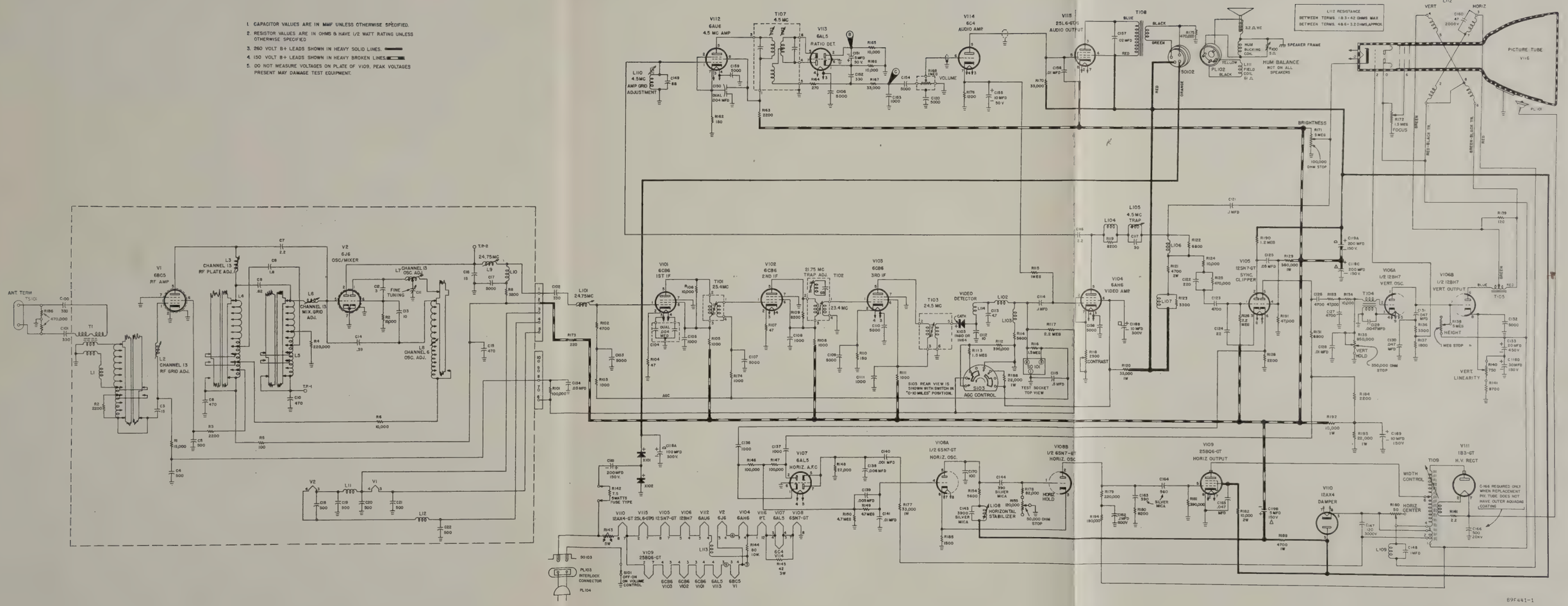
4. 150 VOLT B+ LEADS SHOWN IN HEAVY BROKEN LINES.
5. DO NOT MEASURE VOLTAGES ON PLATE OF V109. PEAK VOLTAGES PRESENT MAY DAMAGE TEST EQUIPMENT.



89F441-1

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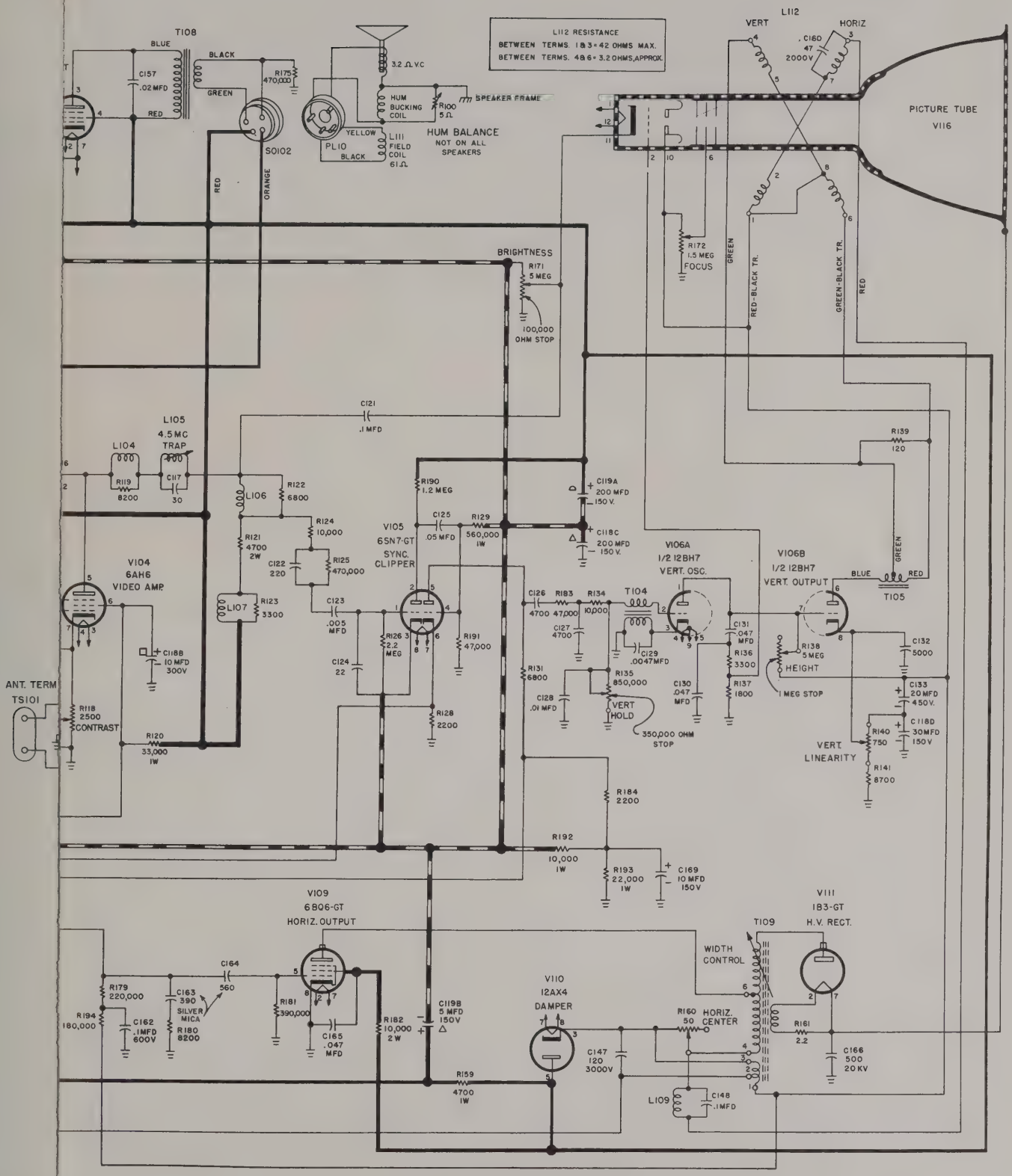
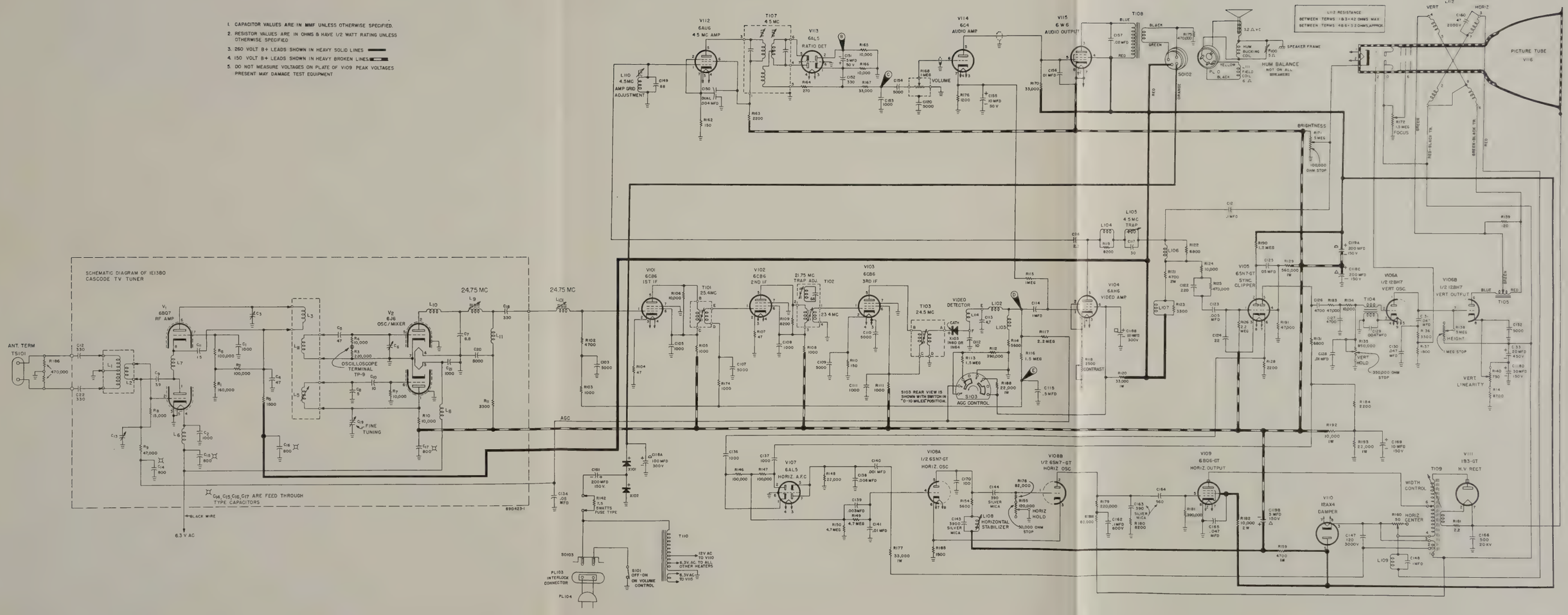
94X955-3
1052

20" CHASSIS
X1200D
RUN 1



89F498

21" CHASSIS
J1200D
RUN 1



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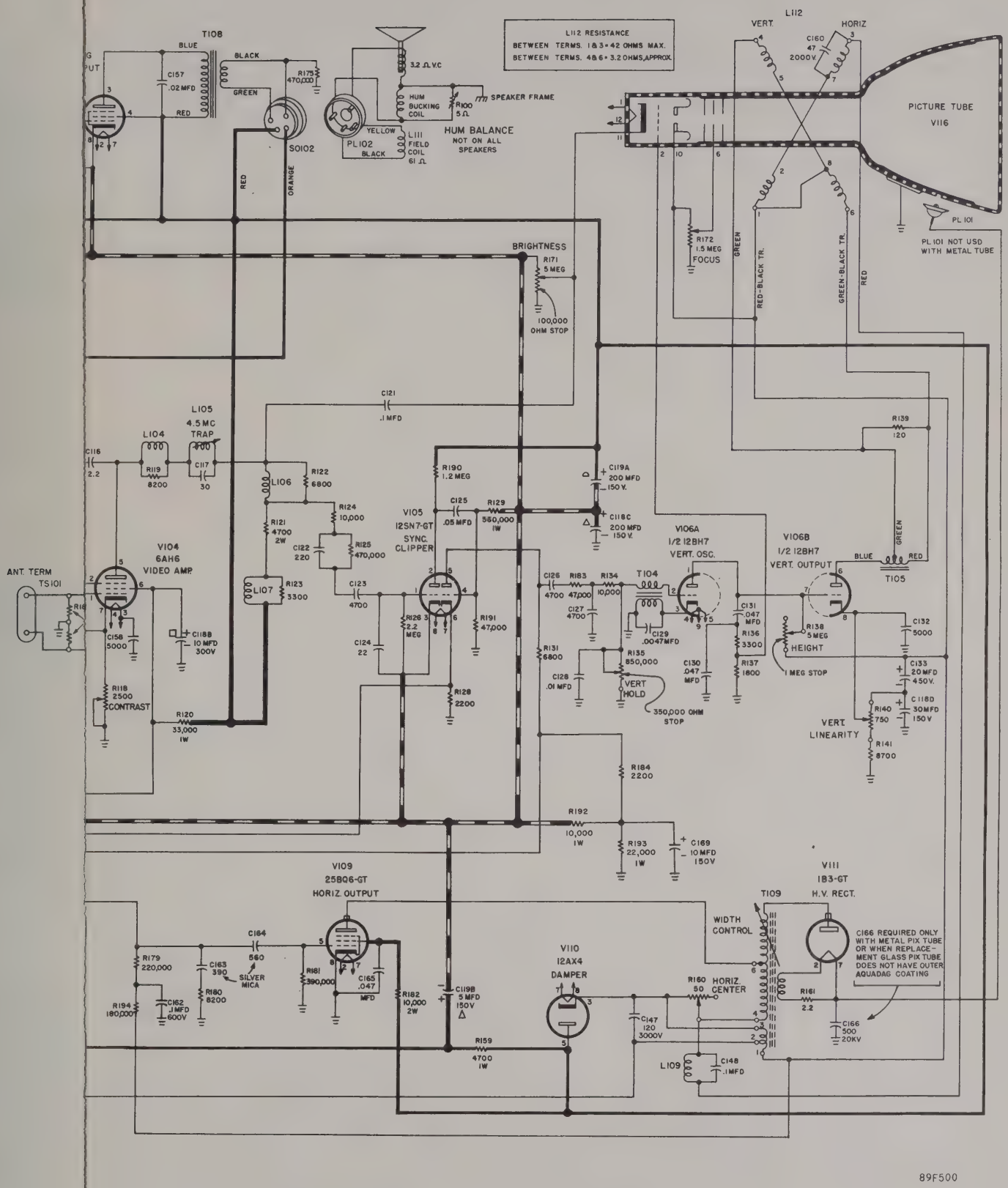
89F498

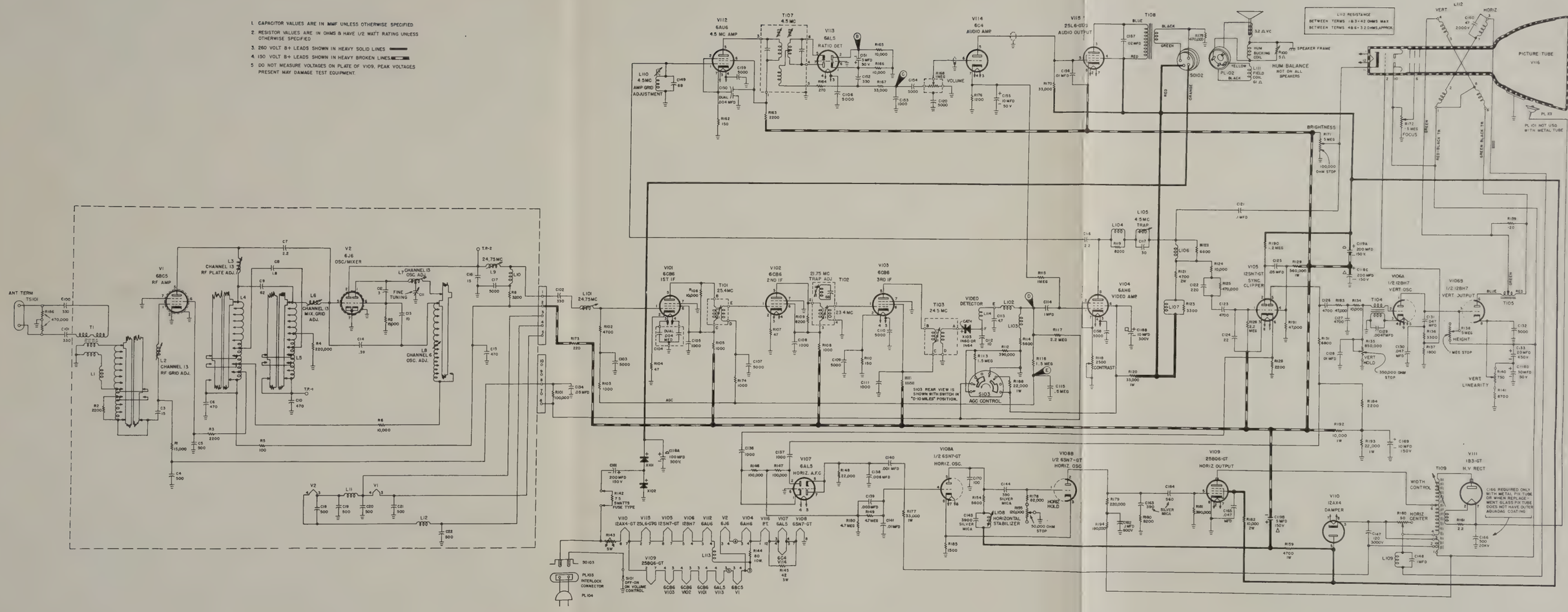
21" CHASSIS
J1200D
RUN 1



89F500

21" CHASSIS
R1200D
RUN 1

1. CAPACITOR VALUES ARE IN MMF UNLESS OTHERWISE SPECIFIED
2. RESISTOR VALUES ARE IN OHMS & HAVE 1/2 WATT RATING UNLESS OTHERWISE SPECIFIED
3. 260 VOLT B+ LEADS SHOWN IN HEAVY SOLID LINES
4. 150 VOLT B+ LEADS SHOWN IN HEAVY BROKEN LINES
5. DO NOT MEASURE VOLTAGES ON PLATE OF V109. PEAK VOLTAGES PRESENT MAY DAMAGE TEST EQUIPMENT.



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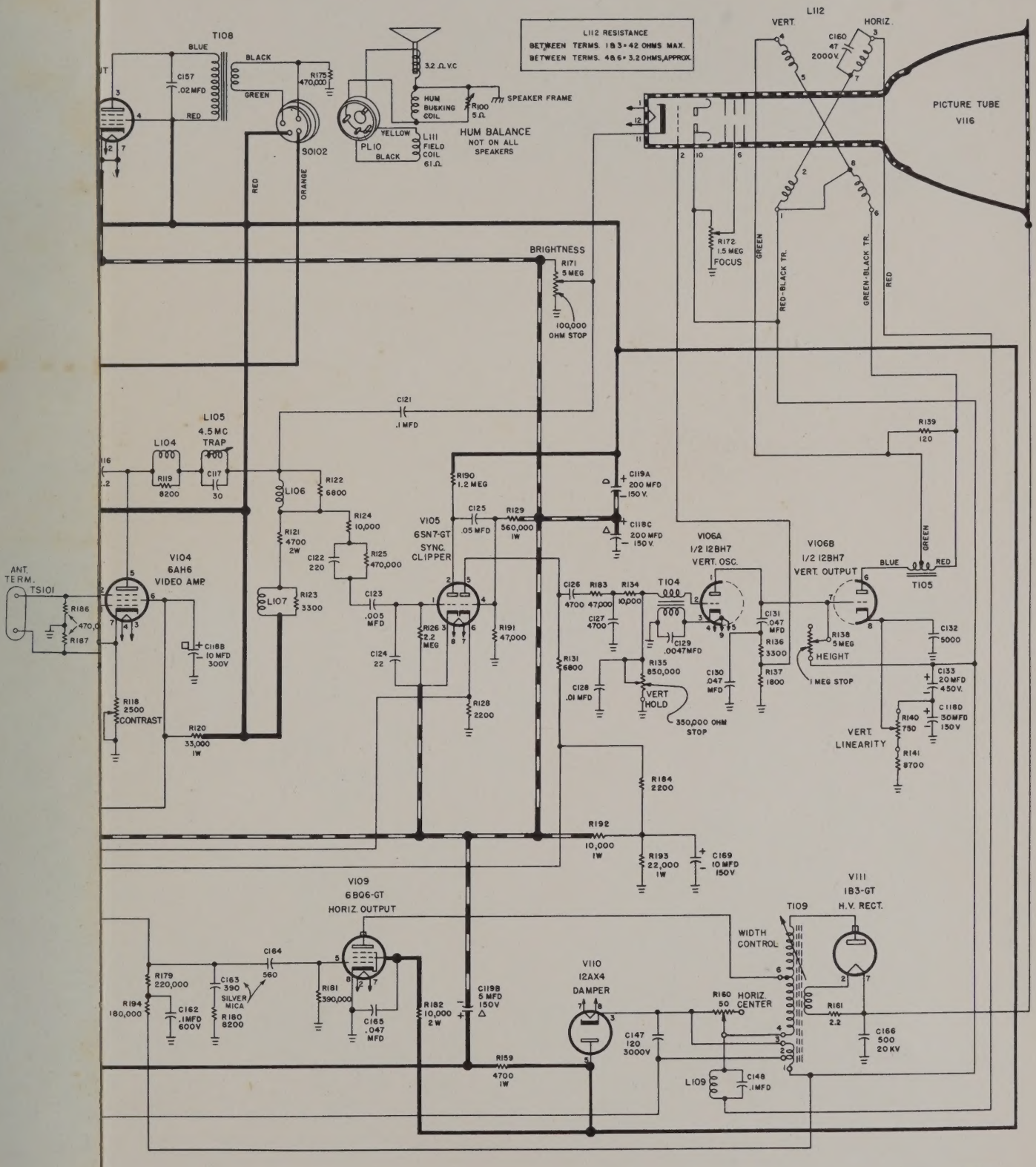
94X955-3
1052

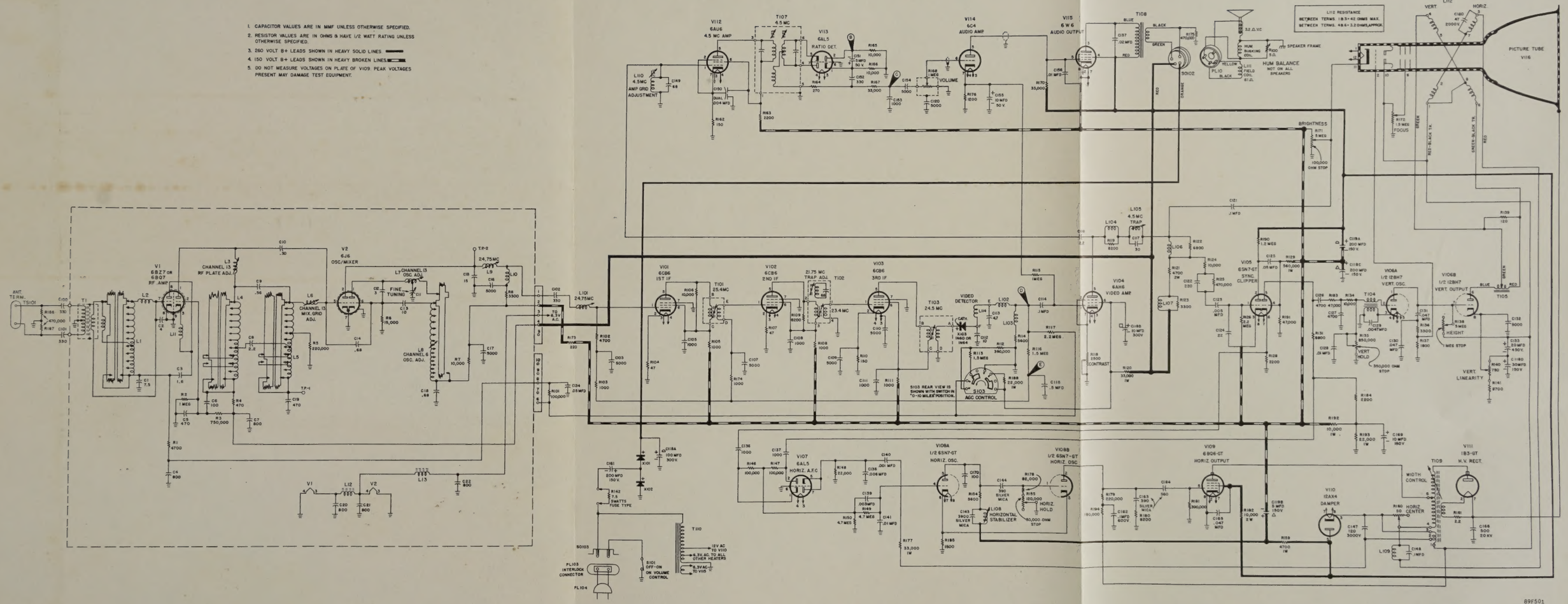
21" CHASSIS
R1200D
RUN 1



89F501

21" CHASSIS
T1200D
RUN 1

1. CAPACITOR VALUES ARE IN MMF UNLESS OTHERWISE SPECIFIED.
2. RESISTOR VALUES ARE IN OHMS & HAVE 1/2 WATT RATING UNLESS OTHERWISE SPECIFIED.
3. 260 VOLT B+ LEADS SHOWN IN HEAVY SOLID LINES.
4. 150 VOLT B+ LEADS SHOWN IN HEAVY BROKEN LINES.
5. DO NOT MEASURE VOLTAGES ON PLATE OF V109. PEAK VOLTAGES PRESENT MAY DAMAGE TEST EQUIPMENT.



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1052

21" CHASSIS
T1200D
RUN 1